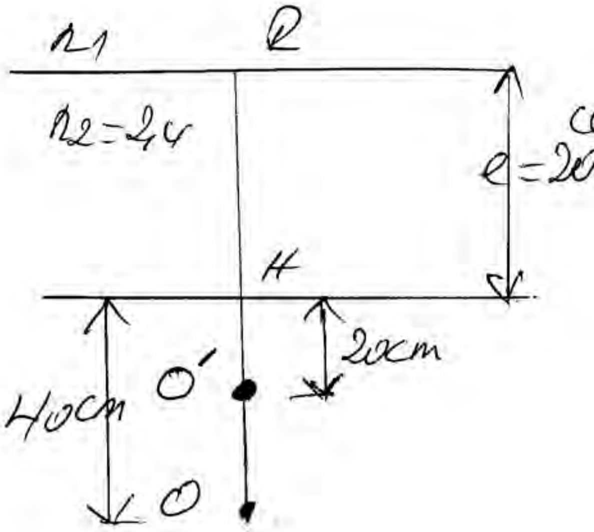
In the name of Allah, the Most Gracious, the Most Merciful

La faculte .NET
seek knowledge



1/ $O \xrightarrow{H} O' \xrightarrow{R} O''$

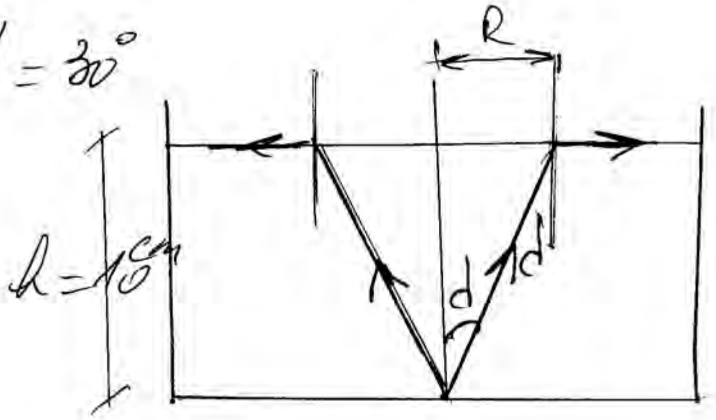
$\quad n_1 \qquad n_2 \qquad n_1$

$\frac{HO}{n_1} = \frac{HO'}{n_2} \to n_1 = \frac{HO}{HO'} \cdot n_2$

$n_1 = \frac{40}{20}\, 2,4 \to n_1 = 4,8$

2/ $tg\, d = \frac{R}{h} \to R = h\, tg\, d$

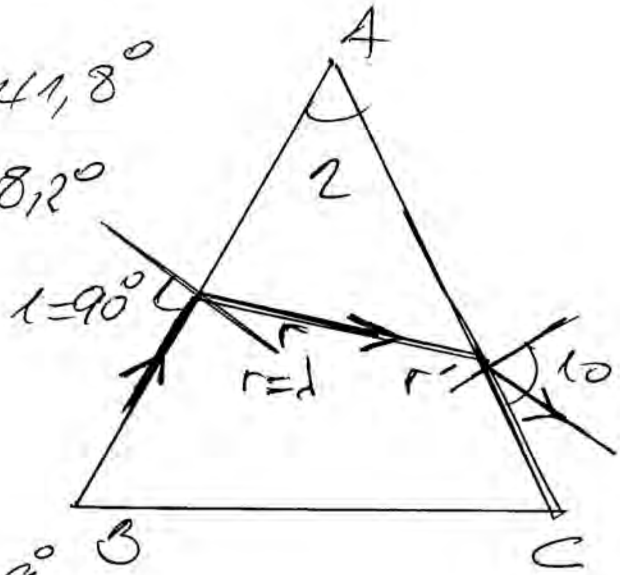
$\sin d = \frac{n_0}{2}$ $\sin d = \frac{1}{2} \to d = 30°$



$R = 10 \times tg\, 30°$

$R = 5,77$ cm

3/ $i = 90° \to r = d$



$\sin d = \frac{1}{2}$ $\quad \sin d = \frac{1}{1,5} \to d = 41,8°$

$A = r + r' \to r' = A - d \quad r' = 18,2°$

$n \sin r' = n_0 \sin i_0$

$\sin i_0 = \frac{n \sin r'}{n_0}$

$\sin i_0 = \frac{1,5}{1} \sin 18,2$

$i_0 = 27,9°$

ou bien directement puisque $i = 90°$ donc $i' = i_0$ avec

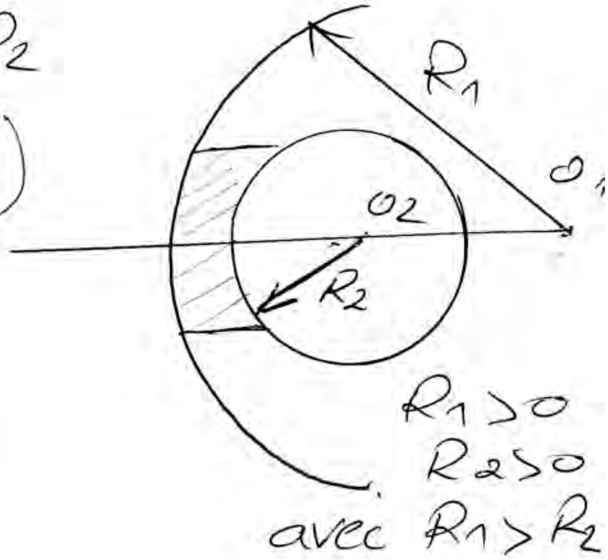
$n_0 \sin i_0 = n \sin (A - d)$

$\sin i_0 = \frac{n}{n_0} \sin (A - d)$

$\sin i_0 = \frac{1,5}{1} \sin(60 - 41,8°) \to i_0 = 41,9°$

1/ Puisque le rayon a pénétré le prisme, il se trouve dans le milieu le moins réfringent donc il émergera → (d)

/ $R_1 > 0$ $R_2 > 0$ avec $R_1 > R_2$



$$C = \frac{1}{OF'} = \left(\frac{n}{n_0} - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$$

$OF' = -40$ cm (Lentille DV)

$$-\frac{1}{40} = \left(\frac{1{,}5}{1} - 1\right)\left(\frac{1}{R_1} - \frac{1}{10}\right)$$

$R_1 = 20$ cm

6/ $OV \rightarrow OA > 0$
I.V $\rightarrow OA' < 0$ $\Big\} \rightarrow \gamma < 0$

2 fois plus grande $\Rightarrow |A'B'| = 2|AB|$

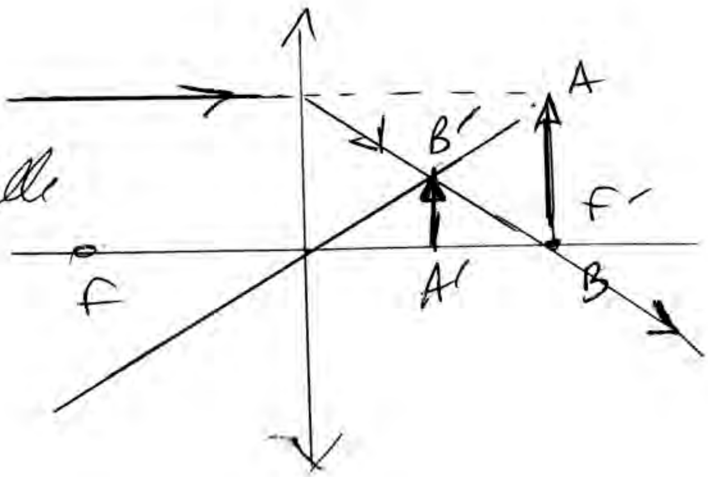
$$\rightarrow \frac{|A'B'|}{|AB|} = 2 \rightarrow |\gamma| = 2 \rightarrow \gamma = -2$$

$$\gamma = \frac{OA'}{OA} \quad OA = 12\text{cm} \rightarrow OA' = -24\text{ cm}.$$

$$\frac{1}{OF'} = \frac{1}{OA'} - \frac{1}{OA} \quad \frac{1}{OF'} = \frac{1}{-24} - \frac{1}{12} \rightarrow OF' = -8\text{cm}$$

7/

A'B' image réelle
→ (d)



2

8/ $A = 4\delta$ oeil normal $OPR = -\infty$

$A = \frac{1}{OPR} - \frac{1}{OPP} \rightarrow OPP = -\frac{1}{OA} \rightarrow OPP = -0,25$ m

$\frac{1}{OPR} \rightarrow 0$

9/ $C_{max} = \frac{1}{OT} - \frac{1}{OPP}$ (avec $OT = 17$ mm)

$\frac{1}{OPP} = \frac{1}{OT} - C_{max} \quad \frac{1}{OPP} = \frac{1}{17 \times 10^{-3}} - 64,7 \rightarrow OPP = -17$ cm

10/ $C = 1\delta \qquad OPR_c = -\infty$

$C = \cancel{\frac{1}{OPR}} - \cancel{\frac{1}{OPP}} \quad$ ~~$OPP = -\frac{1}{C} \rightarrow OPP =$~~

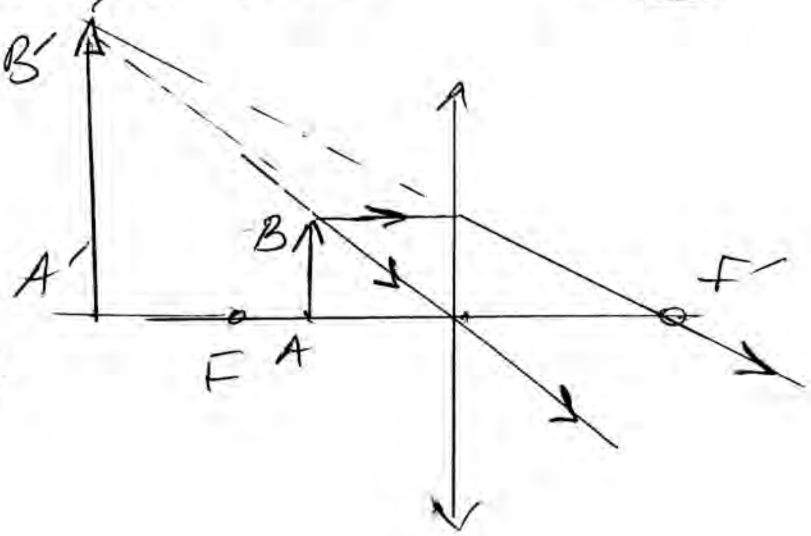
$C = \frac{1}{OPR} - \frac{1}{OPR_c} \quad OPR = \frac{1}{C} \rightarrow OPR = +1$ m

11/ $A = 1\delta$ la presbytie n'affecte pas le PR

$\rightarrow$ OPR ne change pas $\rightarrow$ c

12/ le PP s'éloigne, A varie $\rightarrow$ a

13/



Il s'agit d'une loupe

A'B' = Image virtuelle

$\rightarrow$ a

14/ $i = 60°$

$\sin d = \frac{n_1}{n_2} \quad \sin d = \frac{1,5}{3,5} \quad d = 25,37°$

$i = 60° > d = 25,37 \rightarrow$ réflexion totale

$\rightarrow$ c

15/ $A = 2\delta$ $A = \frac{1}{OPR} - \frac{1}{OPP}$ $OPP = -25cm$

$\rightarrow OPR = -0{,}5m \rightarrow$ myope

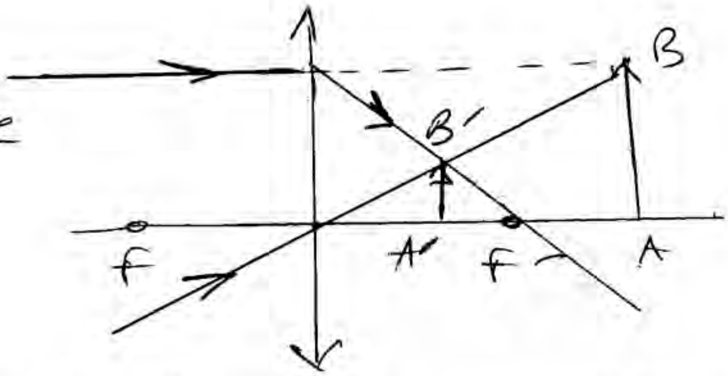
16/ => CV à bords minces → C

17/ ne subit aucune déviation → b

18/ voir page

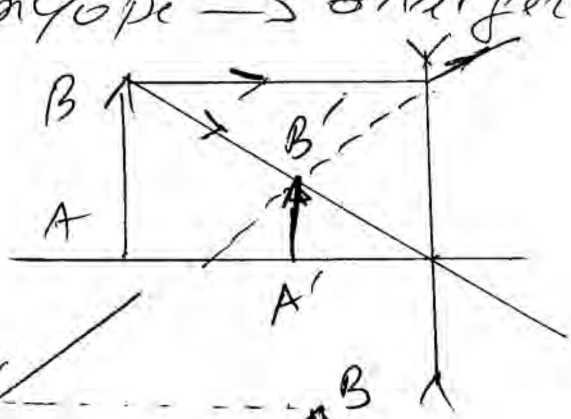
19/ A'B' image réelle droite

→ b



20/ lentille qui corrige la myope → divergente

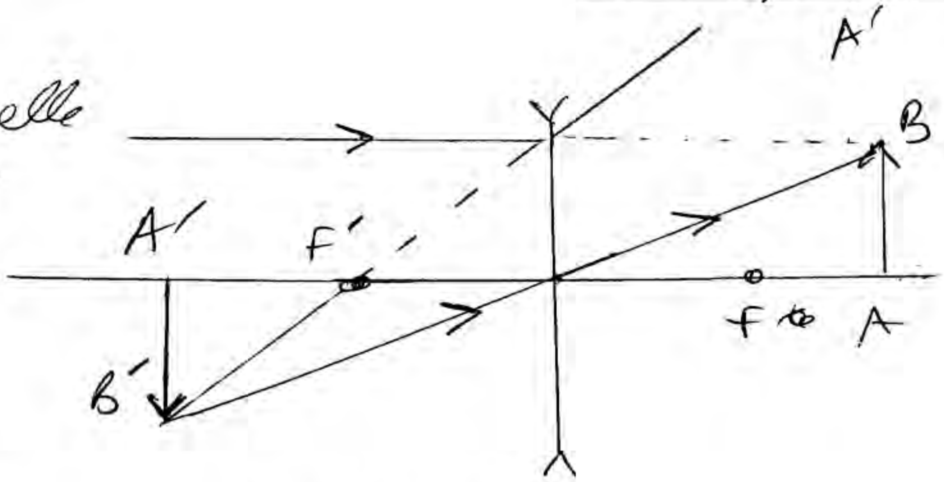
A'B' est virtuelle et droite → a



21/

Image virtuelle et inversée

→ C



22/ $C = \left(\frac{n}{n_0} - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$

il faut changer le milieu tel que l'indice n_0 du milieu soit sup ~~érieur~~ à celui de la lentille n.

23/ oeil emmétrope $\overline{OPR} = -\infty$ $\overline{OPP} = -25$ cm

oeil sur $F'_2 \rightarrow a = 0$ $\overline{O_1A} = -1{,}5$ cm

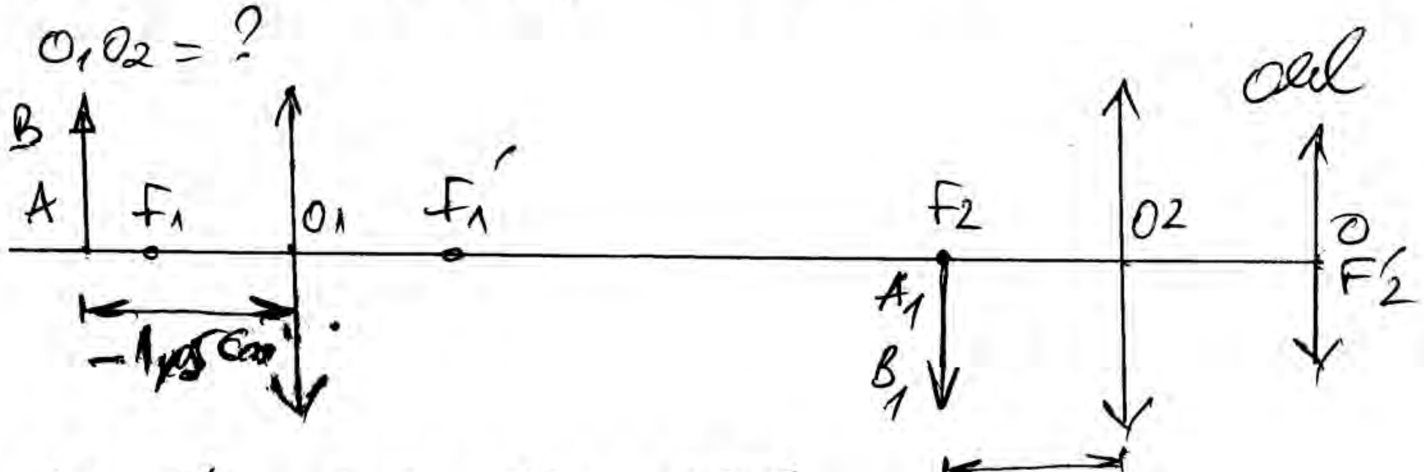
sans accommodation → $A'B'$ à l'infini

$O_2F'_2 = 4$ cm. $G_C = 120$

$|A_1B_1| = 4|AB| \rightarrow \dfrac{|A_1B_1|}{|AB|} = 4 \rightarrow |\gamma_1| = 4$

pour le microscope → $\gamma_1 = -4$

$O_1O_2 = ?$



$AB \xrightarrow{obj} A_1B_1 \xrightarrow{oc} A'B'$ 4 cm
$(-\infty)$

Comme $A'B'$ est à l'infini, donc A_1B_1 est sur F_2

$AB \longrightarrow A_1B$

$A \xrightarrow[O_1F'_1]{O_1} A_1$ $\gamma_1 = \dfrac{\overline{O_1A_1}}{\overline{O_1A}} \rightarrow \overline{O_1A_1} = \gamma_1 \cdot \overline{O_1A}$

$O_1A_1 = (-4)(-1{,}5) \rightarrow O_1A_1 = 6$ cm

$O_1O_2 = O_1A_1 + |O_2F_2|$

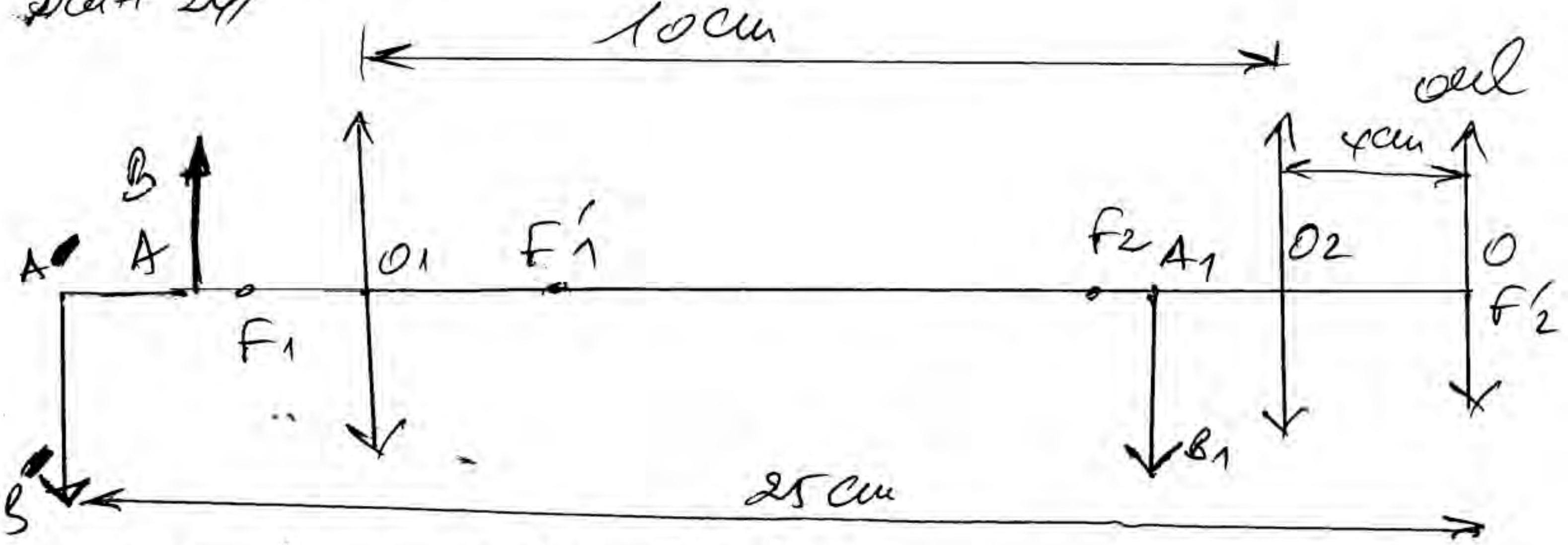
$O_1O_2 = 6 + 4 \longrightarrow O_1O_2 = 10$ cm.

24/ oeil accommode au maximum, donc l'image $A'B'$ est au PP à 25 cm de l'oeil

5

~~25/ [illegible]~~

Qcit 24/



$AB \xrightarrow{ob} A_1B_1 \xrightarrow{oc} A'B'$

$(o2l)$

$(-25cm)$

$A_1B_1 \longrightarrow A'B'$

$A_1 \xrightarrow[O_2F'_2]{O_2} A'$ $\qquad \dfrac{1}{O_2A'} - \dfrac{1}{O_2A_1} = \dfrac{1}{O_2F'_2}$

$\dfrac{1}{O_2A_1} = \dfrac{1}{O_2A'} - \dfrac{1}{O_2F'_2}$ $\qquad \dfrac{1}{O_2A_1} = \dfrac{1}{-21} - \dfrac{1}{4}$ $\qquad O_2A' = -3{,}36\ cm$

$AB \longrightarrow A_1B_1$

$A \xrightarrow[O_1F'_1]{O_1} A_1$ $\qquad \dfrac{1}{O_1A_1} - \dfrac{1}{O_1A} = \dfrac{1}{O_1F'_1}$ $\qquad O_1A_1 = 10 - 3{,}36$

$O_1A_1 = 6{,}64\ cm$

$\dfrac{1}{O_1A} = \dfrac{1}{O_1A_1} - \dfrac{1}{O_1F'_1} \rightarrow \dfrac{1}{O_1A} = \dfrac{1}{6{,}64} - \dfrac{1}{O_1F'_1}$

Calcul de $O_1F'_1$

$\cancel{G_c = \dfrac{\Delta\, L_{ob} \cdot L_{oc}}{4}} \rightarrow \cancel{L_{ob} = \dfrac{4\, G_c}{\Delta}}$

dans la question 23 on a $O_1A_1 = 6\ cm$ $\quad O_1A = -1{,}5\ cm$

$\dfrac{1}{O_1F'_1} = \dfrac{1}{O_1A_1} - \dfrac{1}{O_1A} \rightarrow \dfrac{1}{O_1F'_1} = \dfrac{1}{6} - \dfrac{1}{-1{,}5}$ $\qquad O_1F'_1 = 1{,}2\ cm$

$\dfrac{1}{O_1A} = \dfrac{1}{6{,}64} - \dfrac{1}{1{,}2} \longrightarrow O_1A = -1{,}4647\ cm$

25/ $l = |O_1A|_{PR} - |O_1A|_{PP}$

$l = |-1,5| - |-1,4647|$

$l = 0,0353\ cm$

26/ $OPR = +1\ m \quad A = 4\ \delta$

$A = \frac{1}{OPR} - \frac{1}{OPP} \longrightarrow OPP = -33\ cm$

donc 33 cm en avant de l'oeil

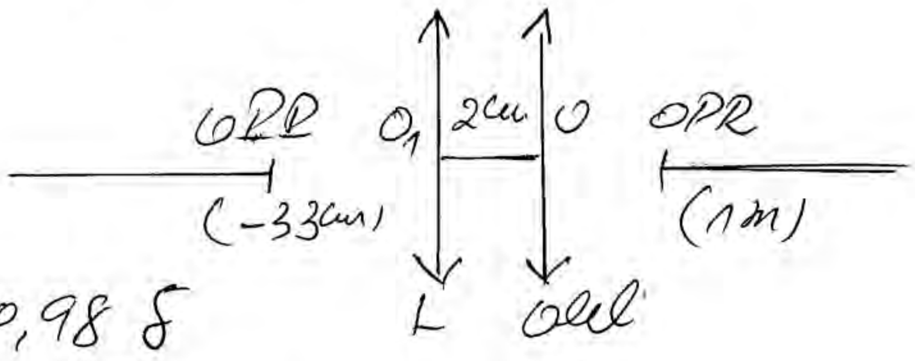
27/ $C = \frac{1}{OPR} - \frac{1}{OPR_C} \quad OPR_C \equiv -\infty$

$C = \frac{1}{OPR} \quad OPR = \frac{1}{C} \quad C = 1\ \delta$

$C = \frac{1}{OPP} - \frac{1}{OPP_C} \longrightarrow OPP_C = -25\ cm$

champ corrigé $]-\infty, -25\ cm]$

28/



$C = \frac{1}{O_1PR} - \frac{1}{O_1PR_C}$

$C = \frac{1}{102\ 10^{-2}} \quad C = 0,98\ \delta$

$C = \frac{1}{O_1PP} - \frac{1}{O_1PP_C} \longrightarrow \frac{1}{O_1PP_C} = \frac{1}{O_1PP} - C$

$\frac{1}{O_1PP_C} = \frac{1}{-0,31} - 0,98 \longrightarrow O_1PP_C = -0,24\ m$

29/ AB réelle et A'B' réelle donc lentille CV $OF' = 4\ cm$

$OA' = +20\ cm$

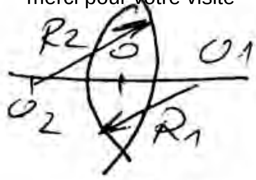
$\frac{1}{OF'} = \frac{1}{OA'} - \frac{1}{OA} \longrightarrow OA = -5\ cm$

$\gamma = \frac{OA'}{OA} \quad \gamma = \frac{20}{-5} \quad \gamma = -4 \quad |A'B'| = |\gamma|\,|AB|$

$\longrightarrow |A'B'| = 8\ cm$

29/ $C=\left(\frac{n}{n_0}-1\right)\left(\frac{1}{R_1}-\frac{1}{R_2}\right)$ $R_1=-R_2$

$C=\frac{1}{OF'}$



$\frac{1}{OF'}=\left(\frac{n}{n_0}-1\right)\left(\frac{2}{R_1}\right)$

$\to n=2,5 \to$ C

$R_1>0$
$R_2<0$
$R_1=-R_2$

30/ $|AB|=0,2$ mm $A'B'$ à l'infini donc AB est sur $F \to OA=-4$ cm. (car $OF'=4$ cm)

31/ $P=C\left(1-\frac{a}{d}\right)$ $d\equiv\infty$ $P=C=\frac{1}{0,04}$ $P=25\,\delta$

32/ $G_C=\frac{P}{4}$ $G_C=\frac{25}{4} \to G_C=6,25$

33/ objet virtuel $\to OA>0$
Image réelle $\to OA'>0$ $\Big\} \to \gamma>0$

$|A'B'|=2|AB| \to |\gamma|=2 \to \gamma=+2$

$\gamma=\frac{OA'}{OA}$ $OA'=2.OA$

$\frac{1}{OA'}-\frac{1}{OA}=\frac{1}{OF'} \to \frac{1}{2(OA)}-\frac{1}{OA}=\frac{1}{OF'}$

$OF'=-2(OA)$

34/ objet réel $\to OA<0$
Image réelle $\to OA'>0$ $\Big\} \to \gamma<0$

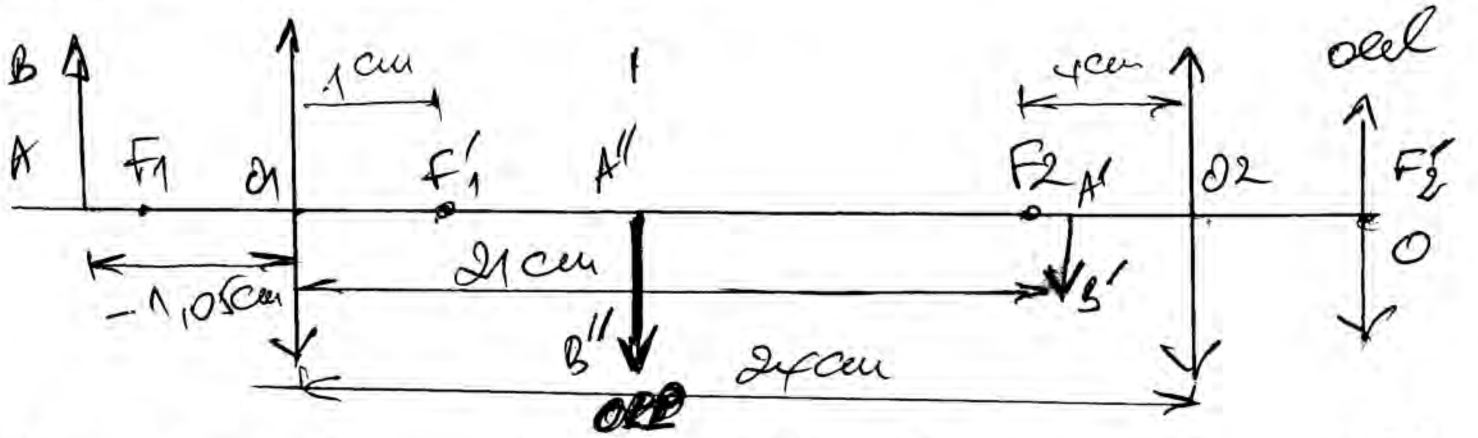
$|A'B'|=|AB| \to |\gamma|=1 \to \gamma=-1$

$\frac{1}{OF'}=\frac{1}{OA'}-\frac{1}{OA}$ $OA'=-OA$

$\frac{1}{OF'}=\frac{1}{-OA}-\frac{1}{OA} \to OF'=-\frac{OA}{2}$

D

35/ oeil Normal $\rightarrow \overline{OPR} = -\infty$



$$P = |\gamma_{ob}| \cdot P_{oc} \qquad \gamma_{ob} = \frac{\overline{O_1A'}}{\overline{O_1A}} \qquad P_{oc} = C_{oc}\left[1 - \frac{a}{d}\right]$$

$$a = 0 \rightarrow P_{oc} = C_{oc} \qquad P_{oc} = \frac{1}{\overline{O_2F'_2}} \qquad P_{oc} = \frac{1}{0{,}04}$$

$$P_{oc} = 25\ \delta$$

$$AB \xrightarrow{obj} A'B' \xrightarrow{oc} A''B''$$

$$AB \xrightarrow{obj} A'B'$$

$$A \xrightarrow[\overline{O_1F'_1}]{O_1} A' \qquad \frac{1}{\overline{O_1A'}} - \frac{1}{\overline{O_1A}} = \frac{1}{\overline{O_1F'_1}}$$

$$\frac{1}{\overline{O_1A'}} - \frac{1}{-1{,}05} = \frac{1}{1} \longrightarrow \overline{O_1A'} = +21\ \text{cm}.$$

$$\gamma_1 = \frac{\overline{O_1A'}}{\overline{O_1A}} \qquad \gamma_1 = \frac{21}{-1{,}05} \qquad \gamma_1 = -20$$

$$P = |\gamma_{ob}| \cdot P_{oc} \qquad P = |-20| \cdot 25 \qquad P = 500\ \delta$$

36/ $G = P \times |\overline{ORR}|$

$G = 500 \times |\overline{ORR}|$

on cherche $\overline{ORR}$

$$A'B' \xrightarrow{oc} A''B''$$

$$A' \xrightarrow[\overline{O_2F'_2}]{O_2} A'' \qquad \frac{1}{\overline{O_2A''}} - \frac{1}{\overline{O_2A'}} = \frac{1}{\overline{O_2F'_2}}$$

$$\frac{1}{\overline{O_2A''}} - \frac{1}{-3} = \frac{1}{4} \rightarrow \overline{O_2A''} = -12\ \text{cm}$$

Suite 36

$|OA''| = 12+4 \quad OA'' = 16\,cm$

$OPP = -16\,cm$

$G = P \times |OPP| \quad G = 500 \times |0{,}16| \quad G = 80$

37/ $P = \dfrac{|\alpha''|}{|AB|} \qquad P = \dfrac{\varepsilon}{|AB|_{min}}$

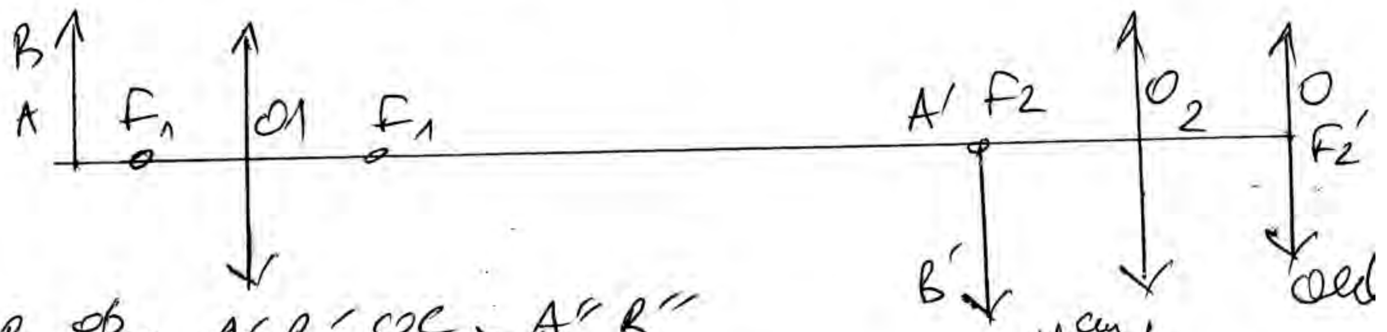
$|AB|_{min} = \dfrac{\varepsilon}{P} \quad |AB|_{min} = \dfrac{0{,}0003}{500} \quad |AB|_{min} = 6\,10^{-7}$

$|AB|_{min} = 0{,}6\,\mu$

38/ $LL = |O_1A|_{PR} - |O_1A|_{PP}$

$|O_1A|_{PP} = 1{,}05\,cm$

on cherche $|O_1A|_{PR}$ càd la position de l'objet tel que l'image $A''B''$ soit au PR



$AB \xrightarrow{ob} A'B' \xrightarrow{oc} A''B''$
$(OPR = -\infty)$

$A''B''$ à l'infini $\rightarrow A'B'$ sur F_2

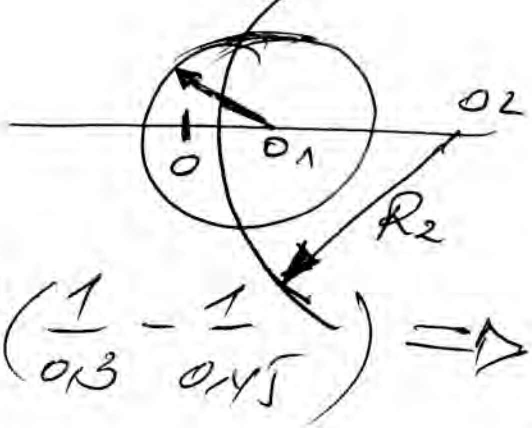
$AB \xrightarrow{ob} A'B'$

$A \xrightarrow[O_1F'_1]{O_1} A' \qquad \dfrac{1}{O_1A'} - \dfrac{1}{O_1A} = \dfrac{1}{O_1F'_1}$

$\dfrac{1}{O_1A} = \dfrac{1}{O_1A'} - \dfrac{1}{O_1F'_1} \rightarrow \dfrac{1}{O_1A} = \dfrac{1}{20} - \dfrac{1}{1} \quad O_1A = -1{,}05\ldots$

$LL = |-1{,}0526| - |-1{,}05| \qquad LL = 0{,}0026\,cm$

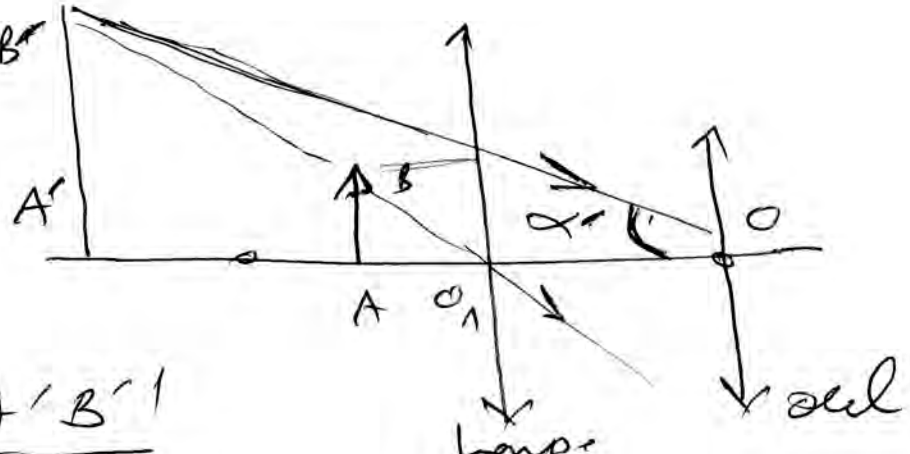
Exo 18/



$R_1 > 0$
$R_2 > 0$
avec $R_2 > R_1$

$C = \left(\frac{3{,}2}{1{,}6} - 1\right)\left(\frac{1}{0{,}3} - \frac{1}{0{,}45}\right) \Rightarrow \begin{cases} R_1 = 0{,}3\ m \\ R_2 = 0{,}45\ m \end{cases}$

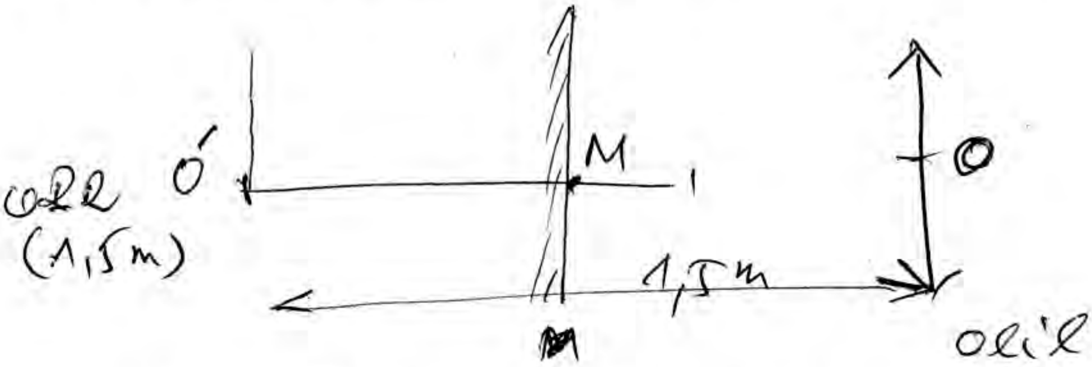
39/



$\alpha' = \frac{|A'B'|}{OA'}$

augmenter α' il faut diminuer OA'
donc l'observateur doit se rapprocher.

46/



pour voir son Image sans accommodation
cette dernière doit se situer sur le PR
et on sait que O et O' sont symétriques
/ au miroir : $|MO'| = |MO|$
$\Rightarrow$ $|2MO| = 1{,}5\ m$ $\rightarrow$ $MO = 75\ cm$

40/ $P = C\left[1 - \frac{a}{\alpha}\right]$ $a = 0$ $P = C$

donc la puissance est égale à C quelle que soit la position de l'objet

41/ $]OPR_c, OPP_c] =]-\infty, -20\ cm]$

$C = -2,5$ $C < 0 \rightarrow$ myope

42/ $C = \frac{1}{OPR} - \frac{1}{\underbrace{OPR_c}_{\to 0}}$ $OPR = \frac{1}{C}$

$OPR = -0,4\ m$.

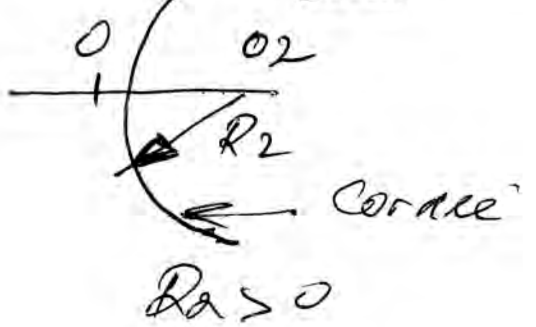
43/ $C = \frac{1}{OPR} - \frac{1}{OPP_c} \rightarrow \frac{1}{OPP_c} = C + \frac{1}{OPP}$

$\frac{1}{OPP} = -2,5 + \frac{1}{-0,2} \rightarrow OPP = -0,133\ m$

44/ $A = \frac{1}{OPR} - \frac{1}{OPP}$ ou bien $A = \frac{1}{OPR_c} - \frac{1}{OPP_c}$

$A = \frac{1}{-0,4} - \frac{1}{-0,133}$ $A = 5\delta$

45/



$C = \left(\frac{n}{n_0} - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$

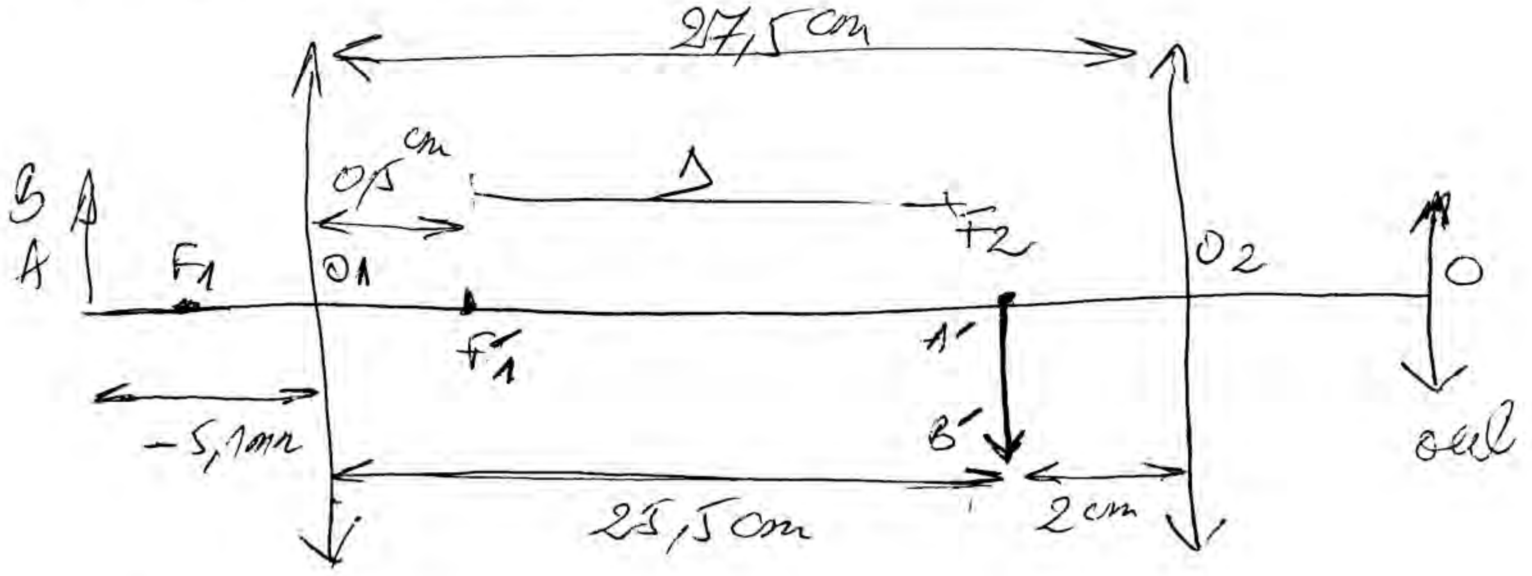
$\rightarrow R_1 = 16,2\ mm$

$R_2 > 0$

$R_2 = 15\ mm$.

47/ $C_{ob} = 200\,\delta$ $\quad O_1F_1' = \frac{1}{200}$ $\quad O_1F_1' = 5\,mm$ $\quad$ I

O $\quad O_2F_2' = 2cm$



$P = \Delta \; C_{ob} \; C_{oc}$

A"B" à l'infini

$$\frac{1}{O_1A'} - \frac{1}{O_1A} = \frac{1}{O_1F_1'}$$

$$\frac{1}{O_1A'} = \frac{1}{O_1F_1'} + \frac{1}{O_1A}$$

$$\frac{1}{O_1A'} = \frac{1}{5} + \frac{1}{-5{,}1} \longrightarrow O_1A' = 255\ mm$$

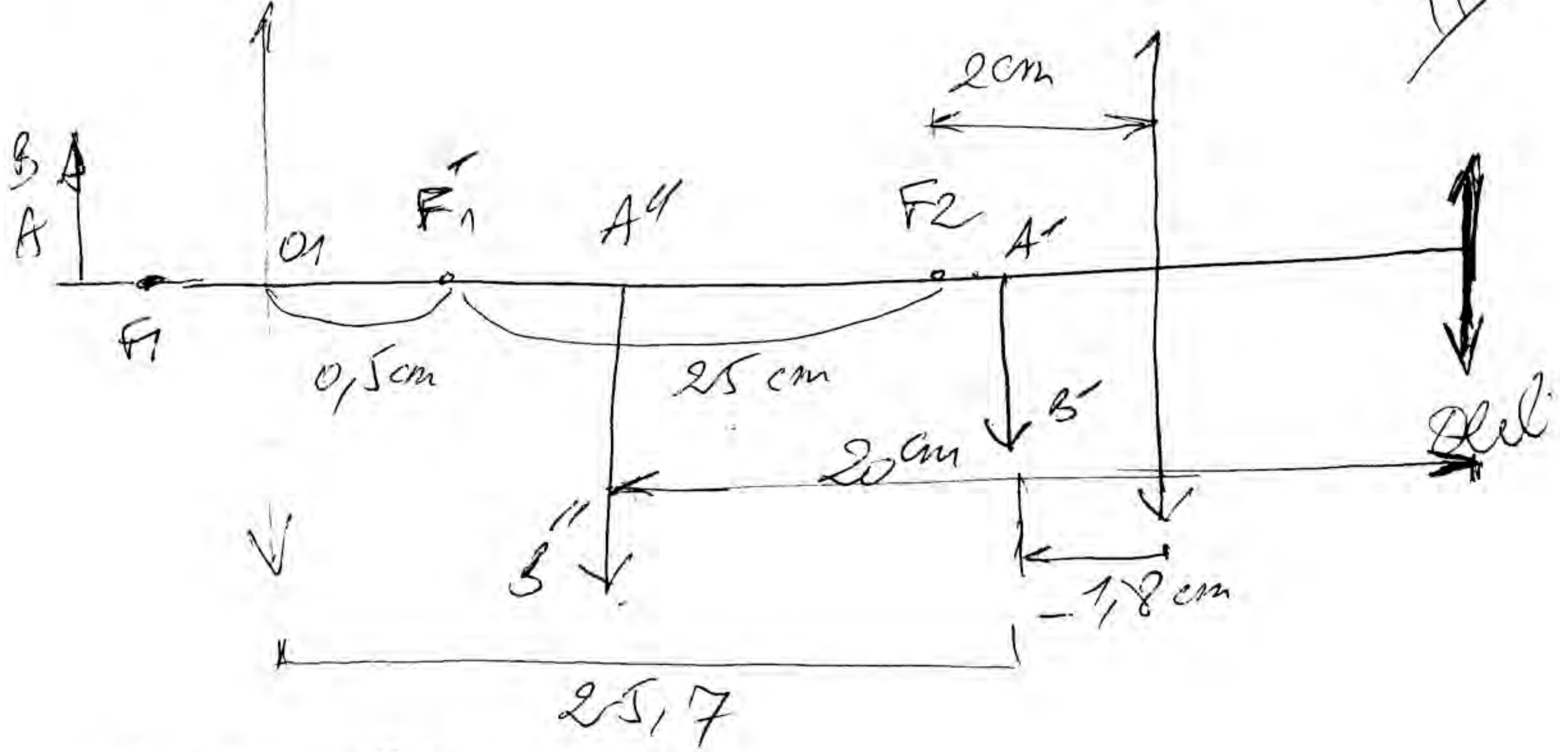
$\Delta = 255 - 5 \quad (\Delta = O_1F_2 - O_1F_1') \quad \Delta = 250\ mm$

$C_{oc} = \frac{1}{O_2F_2'} \qquad C_{oc} = \frac{1}{2.10^{-2}} \qquad C_{oc} = 50\,\delta$

$P = \Delta . C_{ob} . C_{oc} \quad P = 250\,10^{-3} . 200 . 50 \quad P = 2500\,\delta$

48°

II



$$A'B' \xrightarrow[O_2F'_2]{O_2} A''B''$$

$$\frac{1}{\overline{O_2F'_2}} = \frac{1}{\overline{O_2A''}} - \frac{1}{\overline{O_2A'}} \longrightarrow \frac{1}{\overline{O_2A'}} = \frac{1}{\overline{O_2A''}} - \frac{1}{\overline{O_2F'_2}}$$

$$\frac{1}{\overline{O_2A'}} = \frac{1}{-18} - \frac{1}{2} \qquad \overline{O_2A'} = -1,8\,cm$$

$$\rightarrow \overline{O_1A'} = \overline{O_1O_2} - \overline{O_2A'} = 27,5 - 1,8$$

$$AB \xrightarrow[O_1F'_1]{O_1} A'B'$$

$$\frac{1}{\overline{O_1A'}} - \frac{1}{\overline{O_1A}} = \frac{1}{\overline{O_1F'_1}} \rightarrow \frac{1}{\overline{O_1A}} = \frac{1}{\overline{O_1A'}} - \frac{1}{\overline{O_1F'_1}}$$

$$\frac{1}{\overline{O_1A}} = \frac{1}{25,7} - \frac{1}{0,5} \rightarrow \overline{O_1A} = -0,509921\,cm$$

) Suite 48

$d = |\overline{O_1A}|_{PR} - |\overline{O_1A}|_{RR}$

$d = |5,1| - |5,09921|$ $d = 0,00079\ mm$

$d = 0,79\ \mu m$

49/ Accommodation max. 4"13" au RR

$G = P \cdot |\overline{OR_R}|$

$P = |\gamma_{ob}| \cdot P_{oc}$ $\gamma_{ob} = \dfrac{\overline{O_1A'}}{\overline{O_1A}}$ $\gamma_{ob} = \dfrac{25,7}{-0,5099}$

$\gamma_{ob} = -50,4$

$P_{oc} = C_{oc}\left[1 - \dfrac{a}{x}\right]$ $a = 0$ $P_{oc} = C_{oc} = 50\delta$

$P = |-50,4| \times 50 \rightarrow P = 2520\ \delta$

$G = 2520 \times |0,2|$ $G = 504.$

50/ $G_c = A \cdot C_{ob} \cdot C_{oc}/4$

$G_c = \dfrac{0,25 \times 200 \times 50}{4} \rightarrow G_c = \dfrac{2500}{4}$

$G_c = 625$

51/ $P = \dfrac{\varepsilon}{|AB|_{min}} \longrightarrow |AB|_{min} = \dfrac{\varepsilon}{P}$

$|AB|_{min} = \dfrac{3\,10^{-4}}{2520}$ $|AB|_{min} = 1,19\ 10^{-7}\ m$

J2/ $\overline{OPR} \equiv -\infty$ $\overline{OPP} = -40\,cm$

$A = \frac{1}{\overline{OPR}} - \frac{1}{\overline{OPP}}$ $A = \frac{1}{\infty} - \frac{1}{-0{,}4}$ $A = 2{,}5\,\delta$

J3/ $C_{max} = ?$ $C_{max} = \frac{1}{\overline{OT}} - \frac{1}{\overline{OPP}}$

$C_{max} = \frac{1}{17\,10^{-3}} - \frac{1}{-0{,}4}$ $C_{max} = 61{,}32\,\delta$

J4/ ~~myope~~ $\overline{OPP} = -5m$ → Presbyte

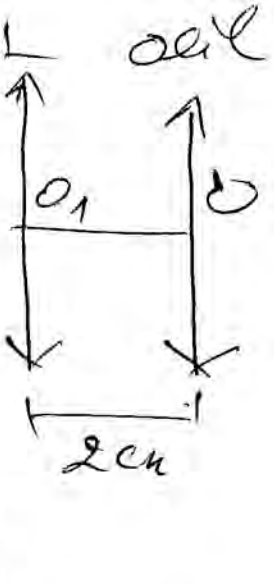
J5/ $A = \frac{1}{\overline{OPR}} - \frac{1}{\overline{OPP}}$

la Puissance de l'amétropie est $P = \frac{1}{\overline{OPR}}$

$\frac{1}{\overline{OPR}} = A + \frac{1}{\overline{OPP}} = P \rightarrow P = 6 + \frac{1}{-5}$ $P = 5{,}8\,\delta$

J6/

$C = \frac{1}{\overline{O_1PR}} - \frac{1}{\overline{O_1PR_C}}$ oPP $(-5m)$



oPR $(17cm)$

$\overline{O_1PR_C} \equiv \infty$

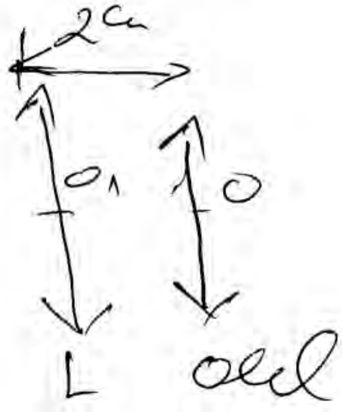
or $P = \frac{1}{\overline{OPR}} \rightarrow \overline{OPR} = \frac{1}{P}$

$\overline{OPR} = 0{,}17\,m \rightarrow \overline{O_1PR} = 19\,cm$

$C = \frac{1}{\overline{O_1PR}}$ $C = \frac{1}{0{,}19}$ $C = 5{,}2\,\delta$

I7/ $C = \frac{1}{O_1PP} - \frac{1}{O_1PR_c} \rightarrow \frac{1}{O_1PR_c} = \frac{1}{O_1PP} - C$

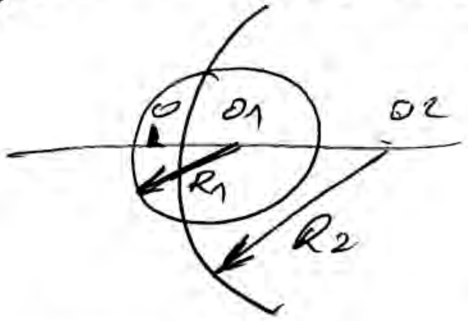
$\frac{1}{O_1PR_c} = \frac{1}{(-4,98)} - 5,2$



$O_1PR_c = (-0,184)$

$\rightarrow OPR_c = -20,5\,cm.$

I8/ oeil sur F' $\rightarrow a = 0$



$R_1 > 0 \quad R_2 > 0$

avec $R_2 > R_1$

$\rightarrow R_2 = 4\,cm$

$OPP = -15\,cm$

$OPR = -50\,cm$

$C = \left(\frac{n}{n_0} - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$ avec $P = C\left(1 - \frac{a}{d}\right) = C$

$P = C = 12,5\,\delta$

$\frac{1}{R_1} = \frac{C}{\left(\frac{n}{n_0} - 1\right)} + \frac{1}{R_2} \rightarrow R_1 = 0,02\,m$

$R_1 = 2\,cm.$

I9) $d = (O_1F')^2 \left[\frac{1}{OPR + a} - \frac{1}{OPP + a}\right]$

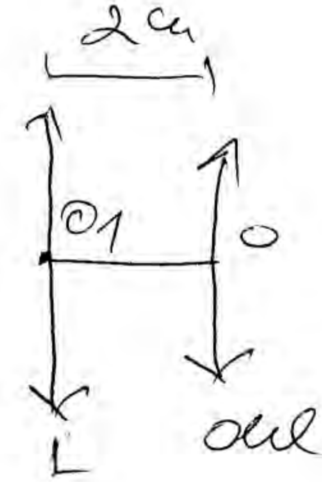
$O_1F' = \frac{1}{C} = \frac{1}{12,5} \rightarrow O_1F' = 0,08\,m$

$\rightarrow d = 2,98\,cm$

60/ $G = P \times$ foRD1

$G = 12{,}5 \times 0{,}15$ / $G = 1{,}87$.

61/

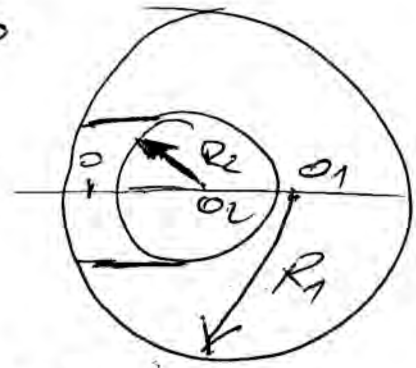


$C = \frac{1}{O_1PR} - \frac{1}{O_1PRC}$ $O_1PRC = -\infty$

$C = \frac{1}{O_1PR}$ $C = \frac{1}{-0{,}48}$ $C = -2{,}08\ \delta$

62/

$C = \left(\frac{n}{n_0} - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$ $R_1 > 0$ $R_2 > 0$ avec $R_1 > R_2$



$\frac{C}{\frac{n}{n_0} - 1} = \frac{1}{R_1} - \frac{1}{R_2}$

$\frac{2{,}08}{\frac{1{,}52}{1} - 1} = \frac{1}{R_1} - \frac{1}{R_2}$ $\frac{1}{R_1} - \frac{1}{R_2} = 4$

63/ $C' = \frac{1}{OPR} - \frac{1}{OPR_c}$ $OPR_c = -\infty$

$\rightarrow$

$C' = \frac{1}{-0{,}5}$ $C' = -2$

$C' < C = -2{,}08 \longrightarrow$ donc la vergence ↘

64/ Presbyte $\longrightarrow$ σ

18

65/ $C_{ob} = 100\,\delta$ $C_{oc} = 20\,\delta$ $O_1O_2 = 16\,cm$

$O_1F'_1 = 1\,cm$. $\Delta = O_1O_2 - (O_1F'_1) - (O_2F'_2)$ $\Delta = 10\,cm$

$G_C = \frac{P_i}{4}$ $G_C = \frac{\Delta . C_{ob} . C_{oc}}{4}$ $G_C = \frac{0,1\ 100\ 20}{4}$ $G_C = 50$

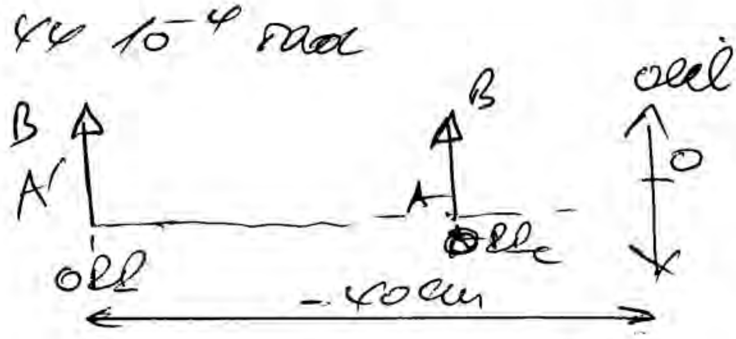
66/ $P_i = \Delta\ C_{ob} . C_{oc}$ $P_1 = 200\,\delta$

67/ $P = \frac{\alpha'}{|AB|} \rightarrow \alpha' = P \times |AB|$ $P = P_i$ car vision sans accommodation

$\alpha' = 200 . 22\ 10^{-6} \rightarrow \alpha' = 44\ 10^{-4}$ rad

68/ $C = \frac{1}{OPP} - \frac{1}{OPP_c}$

$\rightarrow C = -2,5\,\delta$



69/ $OA < 0$ car objet réel $OA = -1\,cm$.

$OA' < 0$ car image virtuelle

Image 2 fois plus petite $\rightarrow |A'B'| = \frac{|AB|}{2} \rightarrow |\gamma| = \frac{1}{2}$

$\gamma = \frac{OA'}{OA}$ $\gamma > 0 \rightarrow \gamma = +\frac{1}{2}$ $OA' = \gamma . OA$

$OA' = \frac{1}{2}(-1) \rightarrow OA' = -0,5\,m$.

$\frac{1}{OF'} = \frac{1}{OA'} - \frac{1}{OA}$

$\frac{1}{OF'} = \frac{1}{-0,5} - \frac{1}{-1} \rightarrow OF' = -1\,m$

$C = \frac{1}{OF'}$ $C = -1\,\delta$

70/ $A = \frac{1}{OPR} - \frac{1}{OPP}$ $C = \frac{1}{OPR} - \frac{1}{OPP_c}$ $OPR = -1\,m$

$A = \frac{1}{-1} - \frac{1}{-0,4} \rightarrow A = 1,5$

71/ Myope car $\overline{OPP} = -0{,}4\,m$
+ lecs byte

72/ $C = \frac{1}{OPP} - \frac{1}{OPP_c} \rightarrow \frac{1}{OPP_c} = \frac{1}{OPP} - C$

$OPP = -66{,}67\,cm.$ $d = 66{,}67\,cm$

73/ $C_{ob} = 50\,\delta$ $C_{oc} = 20\,\delta$

$O_1F'_1 = 2\,cm$ $O_2F'_2 = 5\,cm$ $O_1O_2 = 25\,cm$

$\Delta = 18\,cm$.

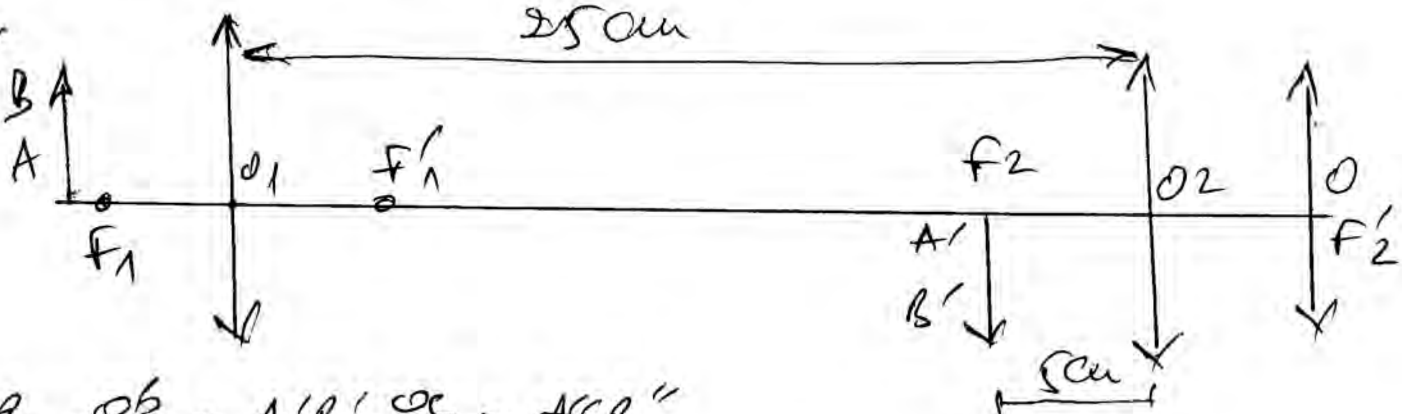
$G = P \times |OPP|$

mise au point à l'infini $\rightarrow P = P_i = \Delta . C_{ob} . C_{oc}$

$P = 0{,}18 . 50 . 20$ $P = 180\,\delta$

$G = |0{,}666| . 180$ $G = 120$

74/



$AB \xrightarrow{ob} A'B' \xrightarrow{oc} A''B''$

$\downarrow$ sur F_2 ∞

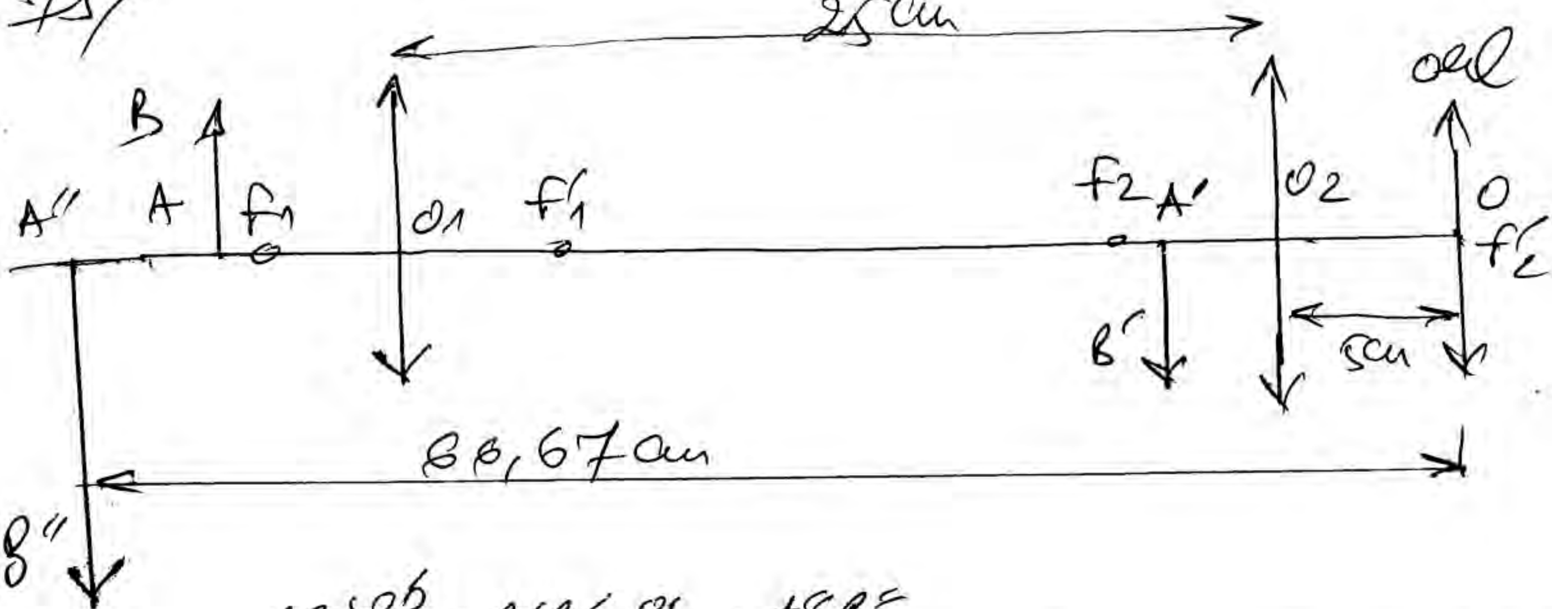
$A''B''$ à l'infini $\rightarrow A'B'$ sur F_2

$AB \xrightarrow{ob} A'B'$

$A \xrightarrow[O_1F'_1]{O_1} A'$ $\frac{1}{\overline{O_1A'}} - \frac{1}{O_1A} = \frac{1}{O_1F'_1}$

$\frac{1}{O_1A} = \frac{1}{O_1A'} - \frac{1}{O_1F'_1}$ $\frac{1}{\overline{O_1A}} = \frac{1}{20} - \frac{1}{2} \rightarrow O_1A = -2{,}2222$

75/



$AB \xrightarrow{ob} A'B' \xrightarrow{oc} A''B''$

PP

$A' \xrightarrow[O_2F_2']{O_2} A''$ $\quad \frac{1}{O_2A''} - \frac{1}{O_2A'} = \frac{1}{O_2F_2'} \rightarrow \frac{1}{O_2A'} = \frac{1}{O_2A''} - \frac{1}{O_2F_2'}$

$\frac{1}{O_2A'} = \frac{1}{-61,67} - \frac{1}{5} \longrightarrow O_2A' = -4,625 \text{ cm}$

$O_1A' = 25 - 4,625 = 20,375$

$AB \longrightarrow A'B'$

$A \xrightarrow[O_1F_1']{O_1} A'$ $\quad \frac{1}{O_1A'} - \frac{1}{O_1A} = \frac{1}{O_1F_1'} \rightarrow \frac{1}{O_1A} = \frac{1}{O_1A'} - \frac{1}{O_1F_1'}$

$\frac{1}{O_1A} = \frac{1}{20,375} - \frac{1}{2} \longrightarrow O_1A = -2,2177 \text{ cm}$

$L = |O_1A|_{PR} - |O_1A|_{PP}$ $\quad L = |-2,2221| - |2,2177|$

$L = 0,004413 \text{ cm} = 44 \cdot 10^{-6} \text{ cm}$

76/ $P = \frac{\varepsilon}{|AB|_{min}}$

$|AB|_{min} = \frac{\varepsilon}{P}$ $\quad P = |\gamma_{ob}| \cdot P_{oc}$

$\gamma_{ob} = \frac{20,375}{-2,217} = -9,18$ $\quad P = 9,18 \cdot 20$ $\quad P = 183,768$

$|AB|_{min} = \frac{4 \cdot 10^{-4}}{183,76}$ $\quad |AB|_{min} = 21,77 \cdot 10^{-6} \text{ m}$

77/ $A = \frac{1}{OPR} - \frac{1}{OPP}$ ou bien $A = \frac{1}{OPR_c} - \frac{1}{OPP_c}$

$OPR_c \equiv -\infty \rightarrow A = -\frac{1}{OPP_c} \rightarrow OPP_c = -\frac{1}{A}$

$\rightarrow OPP_c = -23{,}8\ cm \rightarrow d = 23{,}8\ cm$

78/ $C_{max} = 62{,}5\ \delta$

$C_{max} = \frac{1}{OT} - \frac{1}{OPR} \rightarrow \frac{1}{OPR} = \frac{1}{OT} - C_{max}$

$\frac{1}{OPR} = \frac{1}{17\ 10^{-3}} - 62{,}5 \rightarrow OPR = -27{,}2\ cm$

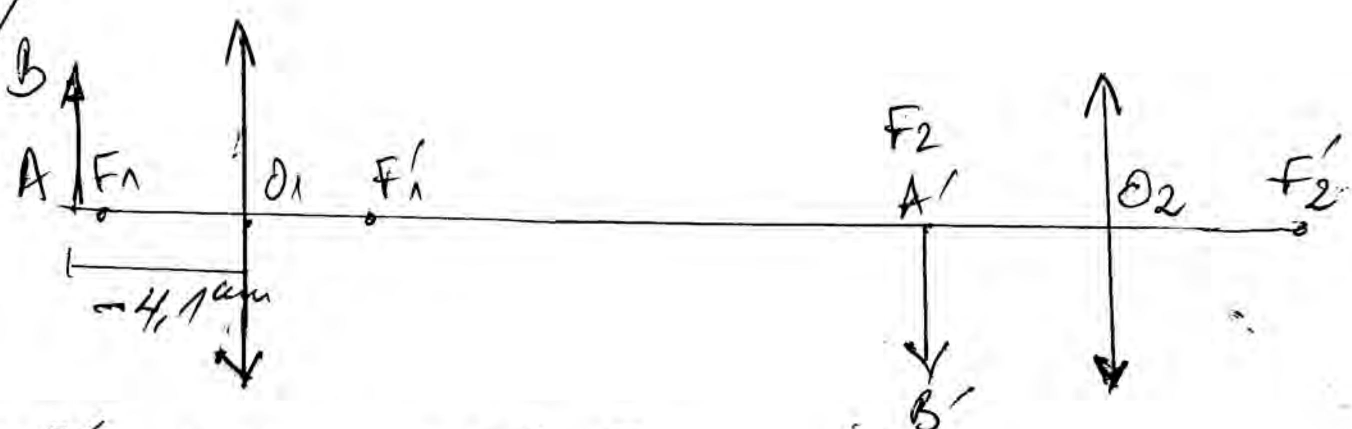
79/ $A = \frac{1}{OPR} - \frac{1}{OPP} \rightarrow \frac{1}{OPP} = \frac{1}{OPR} - A$

$\frac{1}{OPP} = \frac{1}{-27{,}2\ 10^{-2}} - 4{,}2 \longrightarrow OPP = -0{,}127\ m$

$OPP = -12{,}7\ cm.$

80/ $C = \frac{1}{OPR} - \cancel{\frac{1}{OPR_c}}^{0}$ $C = \frac{1}{OPR}$ $C = -3{,}6\ \delta$

81/



$O_1F'_1 = 4\ mm$ $O_2F'_2 = ?$

$O_1O_2 = 184\ mm.$

Suite 81

La Puissance de l'oculaire est égale à la Puissance intrinsèque $\longrightarrow P_i = P_{oc} = C_{oc}\left(1 - \frac{a}{d}\right)$

Comme $P_i = C_{oc}$

$P_{oc} = C_{oc} = \frac{1}{O_2F'_2}$

Comme $P_{oc} = P_i$, donc l'image $A'B'$ est sur F_2

on cherche sa position par rapport à O_1.

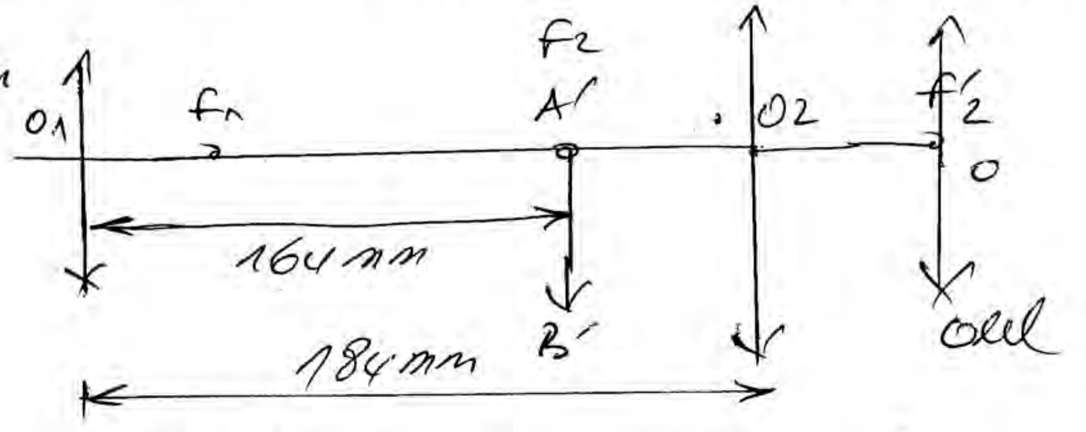
$AB \xrightarrow{ob} A'B'$

$A \xrightarrow[O_1F'_1]{O_1} A'$ $\quad \frac{1}{O_1A'} - \frac{1}{O_1A} = \frac{1}{O_1F'_1}$

$\frac{1}{O_1A'} = \frac{1}{O_1F'_1} + \frac{1}{O_1A} \longrightarrow \frac{1}{O_1A'} = \frac{1}{4} + \frac{1}{-4,1}$

$\longrightarrow O_1A' = 164\,mm \longrightarrow |O_2F_2| = 184 - 164 \quad |O_2F_2| = 20\,mm$

$\longrightarrow O_2F'_2 = +20\,mm$



$P_{oc} = \frac{1}{O_2F'_2} \quad P_{oc} = \frac{1}{20 \cdot 10^{-3}} \quad P_{oc} = 50\delta$

82/ vision sans accommodation + oeil emmétrope donc l'image finale $A''B''$ est à l'infini.

$\longrightarrow P = P_i = \Delta \cdot C_{ob} \cdot C_{oc}$ $\quad \Delta = O_1O_2 - O_1F'_1 - O_2F'_2$

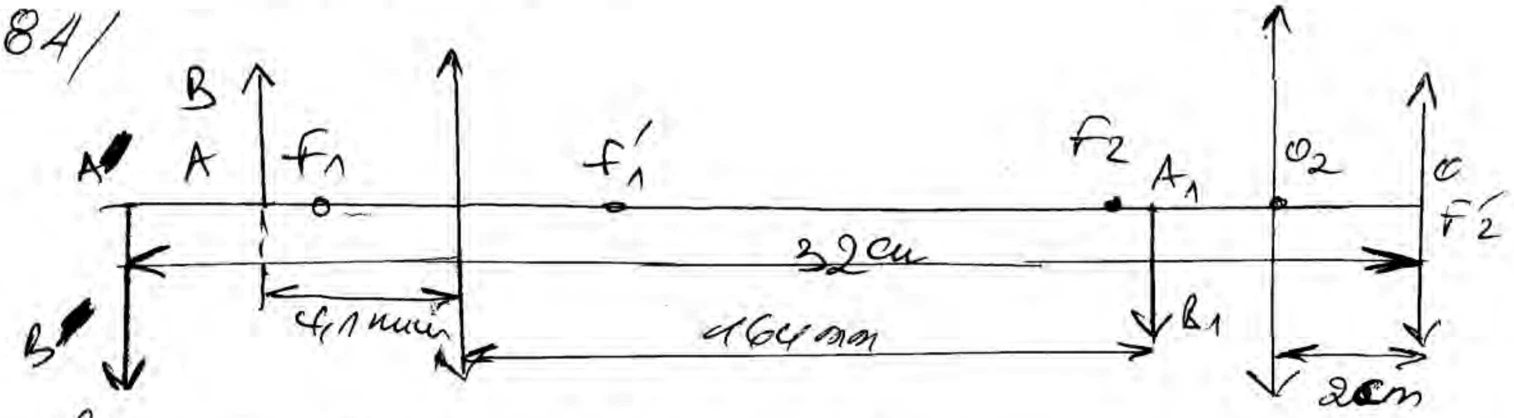
$\Delta = 184 - 4 - 20$

$P = 0{,}16 \times \frac{1}{0{,}004} \times \frac{1}{0{,}02} \quad P = 2000\delta \quad \Delta = 160\,mm$

83/ L'image finale étant toujours à l'infini (vision sans accommodation) → $P = P_i$.

$$P = 2000\ \delta$$

84/



L'image finale A'B' doit être rapprocher donc l'image intermédiaire A_1B_1 doit être après F_2 par suite il faut rapprocher l'oculaire de l'objectif.

85/ Il faut chercher la position de A_1B_1 par rapport à O_2

$$AB \xrightarrow{ob} A_1B_1 \xrightarrow{oc} A'B'$$
(oeil)

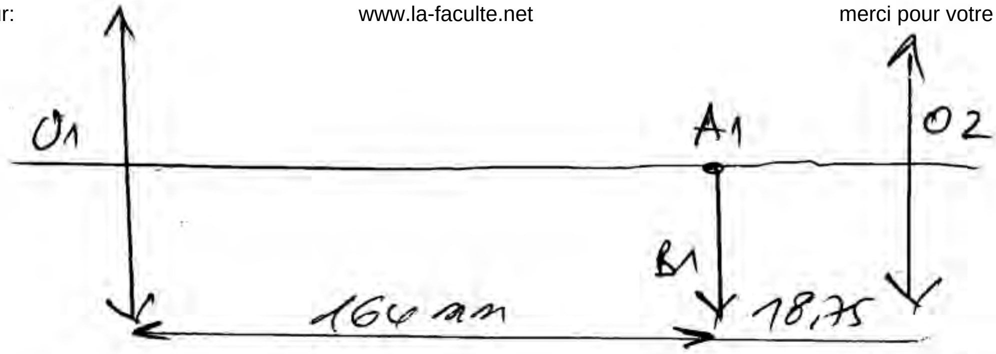
$$A_1B_1 \xrightarrow{Ob} A'B'$$

$$A_1 \xrightarrow[O_2F'_2]{O_2} A' \qquad \frac{1}{\overline{O_2A'}} - \frac{1}{\overline{O_2A_1}} = \frac{1}{\overline{O_2F'_2}}$$

$$\frac{1}{\overline{O_2A_1}} = \frac{1}{\overline{O_2A'}} - \frac{1}{\overline{O_2F'_2}} \rightarrow \frac{1}{\overline{O_2A_1}} = \frac{1}{-30} - \frac{1}{2}$$

$$\overline{O_2A_1} = -1,875\ \text{cm} \qquad \overline{O_2A_1} = -18,75\ \text{mm}.$$

suite 85



la nouvelle distance qui sépare l'objectif de l'oculaire est $(O_1O_2)' = 164 + 18,75$

$$(O_1O_2)' = 182,75$$

déplacement $= (O_1O_2) - (O_1O_2)'$

$d = 184 - 182,75$ $\quad d = 1,25$ mm

ou bien pour une Image au RR l'image A1B1 était à 20mm, pour une Image au PP elle est à 18,75 donc le déplacement est

$$d = 20 - 18,75$$

$$d = 1,25 \text{ mm}.$$

86/ $P = \gamma_{ob} . P_{oc}$

$\gamma_{ob} = \frac{O_1A_1}{O_1A}$ $\quad \gamma_{ob} = \frac{164}{-4,1}$ $\quad \gamma_{ob} = -40$

$P_{oc} = C_{oc}\left[1 - \frac{a}{d}\right]$ oeil sur $F'_2 \rightarrow P_{oc} = C_{oc} = 50\delta$

$P = |40| \times 50$ $\quad P = 2000\ \delta$

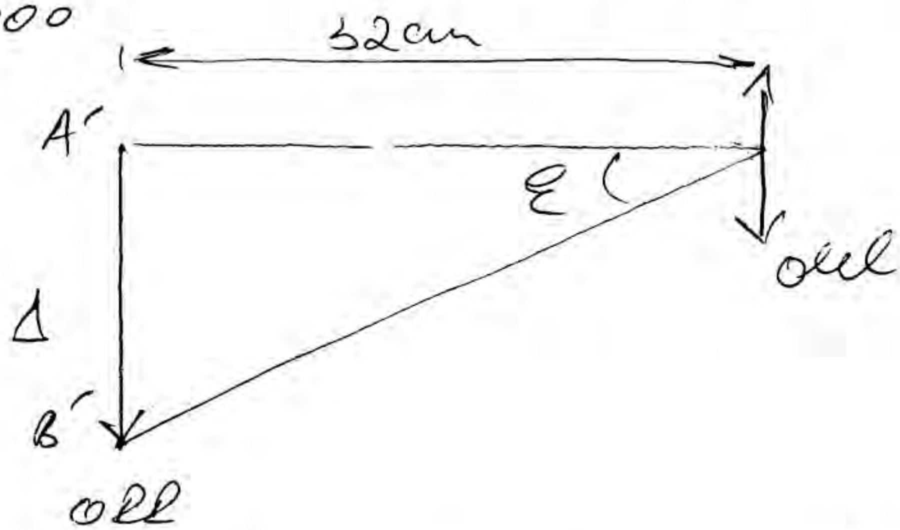
87/ $G = P \times |OPP|$

$G = 2000 . |0,32|$ $\quad G = 640$

88/ $\rho = \dfrac{\varepsilon}{|AB|_{oeil}} \longrightarrow |AB|_{oeil} = \dfrac{\varepsilon}{\rho}$

$|AB|_{oeil} = \dfrac{4\,10^{-3}}{2000}$ $\quad |AB|_{oeil} = 2\,10^{-6}\,m$ $\quad |AB| = 2\,\mu m$

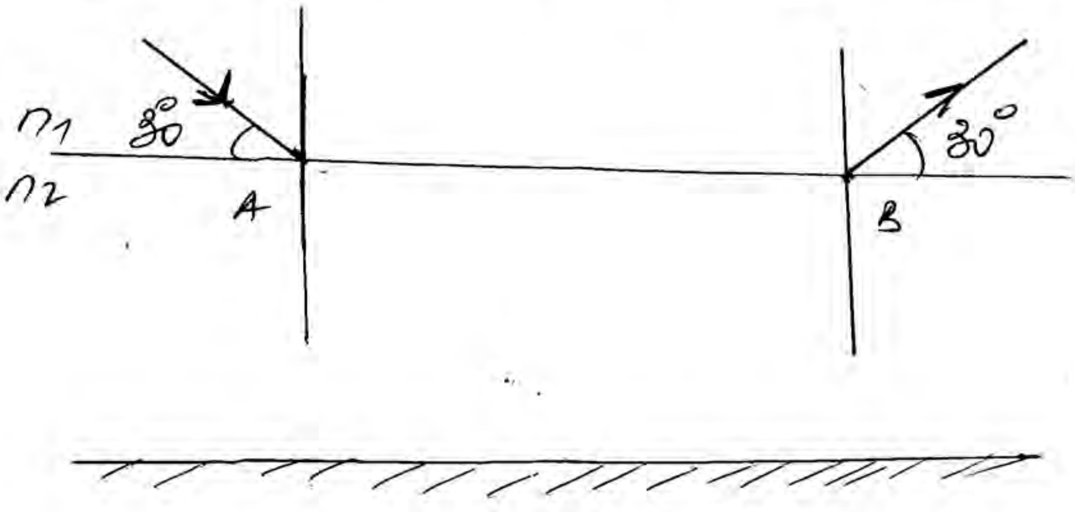
89/



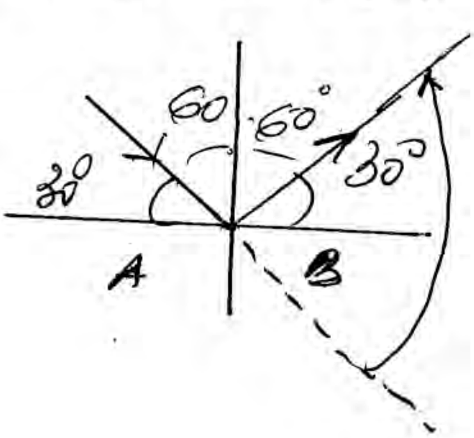
$\varepsilon = \dfrac{\Delta}{oeil} \longrightarrow \Delta = \varepsilon \,.\, oeil$ $\quad \Delta = 4\,10^{-3} . 32\,10^{-2}$

$\Delta = 128\,10^{-5}\,m$ $\quad \Delta = 128\,10^{-2}\,mm$ $\quad \Delta = 1{,}28\,mm.$

90/



Méthode directe



$D_T = 180 - 2 \times 60$

$D_T = 60°$

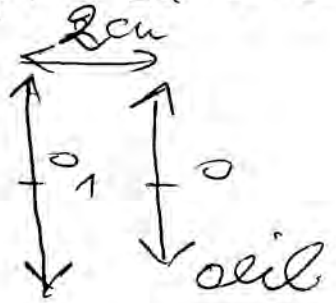
91/ $OPR = 1{,}5\,m \quad A = 4\,\delta$

$$A = \frac{1}{OPR} - \frac{1}{OPP} \longrightarrow \frac{1}{OPP} = \frac{1}{OPR} - A$$

$$\frac{1}{OPP} = \frac{1}{1{,}5} - 4 \qquad OPP = -0{,}30\,m$$

$OPP =$ 30 cm en avant de l'oeil

92/



$$C = \frac{1}{OPR} - \frac{1}{OPR_c} \qquad OPR_c \equiv \infty$$

$$C = \frac{1}{1{,}5} \longrightarrow C = 0{,}67\,\delta$$

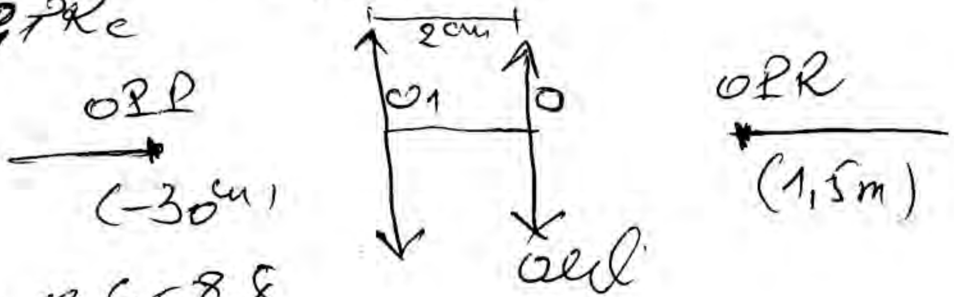
$$C = \frac{1}{OPP} - \frac{1}{OPP_c} \longrightarrow \frac{1}{OPP_c} = \frac{1}{OPP} - C$$

$$\frac{1}{OPP_c} = \frac{1}{-0{,}30} - 0{,}67 \longrightarrow OPP_c = -0{,}25\,m$$

$]-\infty, -25\,cm]$

93/ $C = \dfrac{1}{O_1PR} - \dfrac{1}{O_1PR_c} \qquad O_1PR_c \equiv -\infty$

$$C = \frac{1}{O_1PR}$$



$$C = \frac{1}{1{,}52} \qquad C = 0{,}658\,\delta$$

$$C = \frac{1}{O_1PP} - \frac{1}{O_1PP_c} \longrightarrow \frac{1}{O_1PP_c} = \frac{1}{O_1PP} - C$$

$$\frac{1}{O_1PP_c} = \frac{1}{-0{,}28} - 0{,}658 \qquad O_1PP_c = -23{,}64\,cm$$

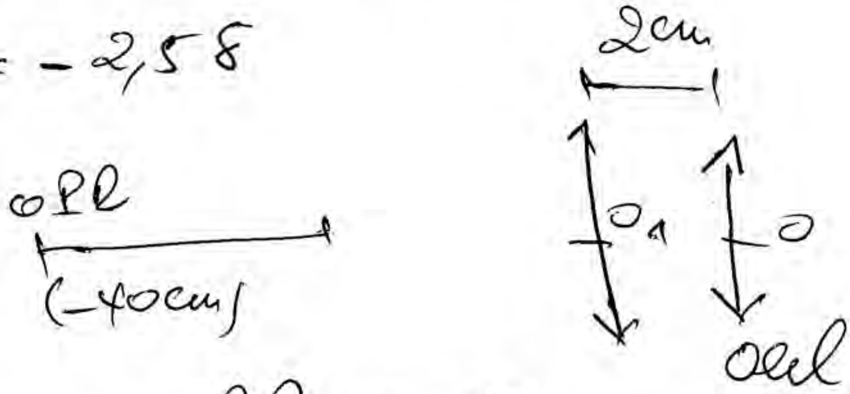
$]-\infty, -23{,}64]$

27

94/ $\Rightarrow OPR = -40\,cm \rightarrow$ Myope

95/ $P = \frac{1}{OPR}$ $P = -2{,}5\ \delta$

96/



$C = \frac{1}{O_1PR} - \frac{1}{O_1PR_c}$ $O_1PR_c \equiv -\infty$

$C = \frac{1}{O_1PR}$ $C = \frac{1}{-38\ 10^{-2}}$ $C = -2{,}63\ \delta$

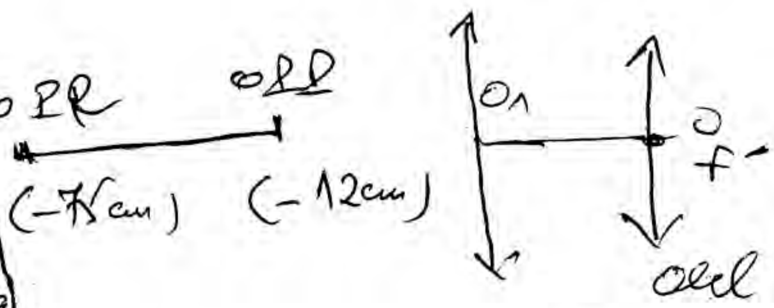
97/ $C' = \frac{1}{OPR} - \frac{1}{OPR_c}$ $OPR_c \equiv -\infty$

$C' = \frac{1}{OPR}$ $C' = \frac{1}{-0{,}4}$ $C' = -2{,}5\ \delta$

donc la verfesce

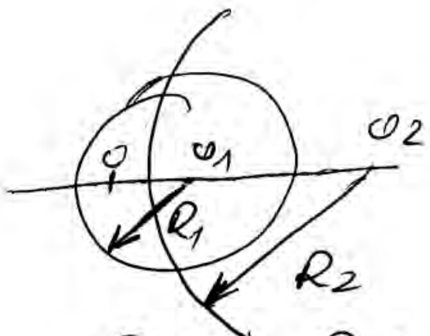
98/

$a = 0$



$d = (O_1F')^2 \left[\frac{1}{OPR + a} - \frac{1}{OPP + a}\right]$

$C = \frac{1}{O_1F'} = \left(\frac{n}{n_0} - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$



$\rightarrow C = 10\ \delta \rightarrow O_1F' = 0{,}1\,m$

$d = (0{,}1)^2 \left[\frac{1}{-0{,}75 + 0} - \frac{1}{-0{,}15 + 0}\right]$

$R_1 > 0$ $R_2 > 0$

$R_2 > R_1$

$d = 0{,}07\,m$ $d = 7\,cm$

$R_1 = 2{,}5\,cm$
$R_2 = 5\,cm$

99/ $P = C\left(1 - \frac{a}{d}\right)$ $a = 0$ $P = C = 10\,\delta$

100/ $G = P \times |0,PP'|$ $G = 10 \times 0,12$

$G = 1,2$

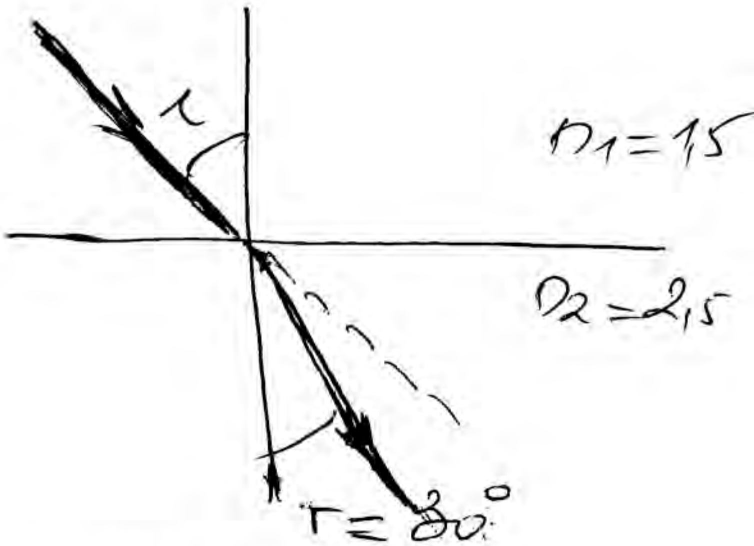
101/ $G' = P \times |0PP'|$

$G' = 10 \times 0,25$ $G' = 2,5$

grossissement plus important

102/

réfracté + réfléchi



103/ OA réel $\rightarrow$ $OA = -15$ cm

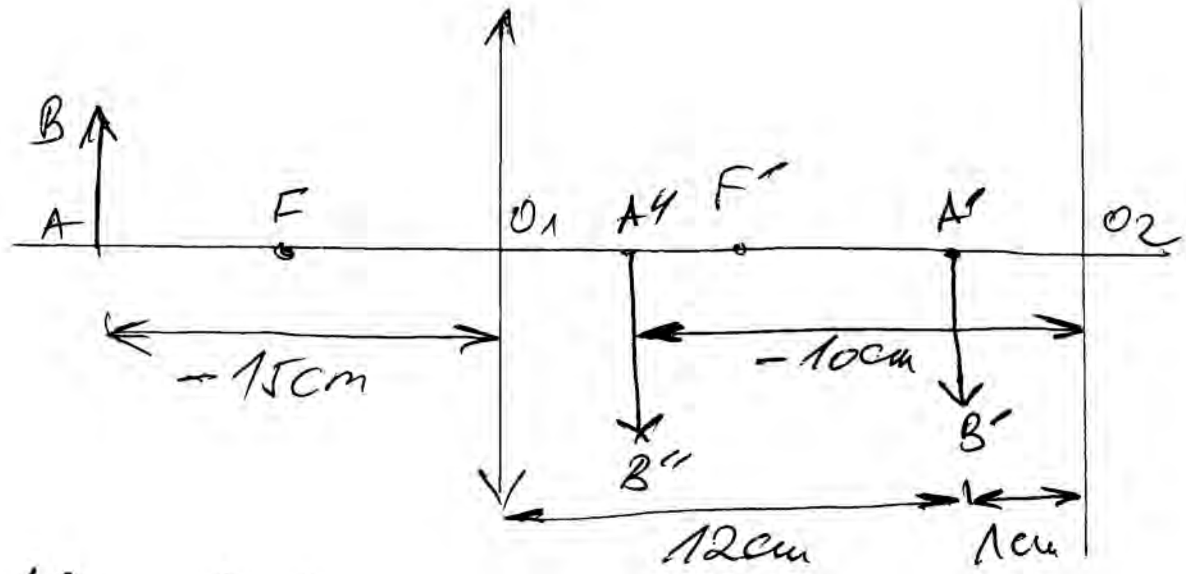
OA' réelle $\rightarrow$ $OA' > 0$ $OA' = 12$cm

$\frac{1}{OF'} = \frac{1}{OA'} - \frac{1}{OA} \rightarrow \frac{1}{OF'} = \frac{1}{12} - \frac{1}{-15}$

$OF' = 6,67$ cm.

104/ $\gamma = \frac{OA'}{OA}$ $\gamma = \frac{12}{-15}$ $\gamma = -0,8$

105/



$A'B' \xrightarrow{L_2} A''B''$

$A''B''$ droite $\longrightarrow \gamma > 0 \longrightarrow O_2A'' < 0$

$|A''B''| = 4$ cm. $\quad O_2A' = -1$ cm

$O_2A'' = -10$ cm.

$A' \xrightarrow[O_2F'_2]{O_2} A''$

$$\frac{1}{O_2F'_2} = \frac{1}{O_2A''} - \frac{1}{O_2A'} \longrightarrow \frac{1}{O_2F'_2} = \frac{1}{-10} - \frac{1}{-1}$$

$\longrightarrow O_2F'_2 = 1{,}11$ cm.

106/ $|\gamma_2| = \dfrac{|A''B''|}{|A'B'|} \longrightarrow |A'B'| = \dfrac{|A''B''|}{|\gamma_2|}$

$\gamma_2 = \dfrac{O_2A''}{O_2A'} \quad \gamma_2 = \dfrac{-10}{-1} \quad \gamma_2 = 10 \quad |A'B'| = \dfrac{4}{10}$

$|A'B'| = 0{,}4$ cm

$|\gamma_1| = \dfrac{|A'B'|}{|AB|} \longrightarrow |AB| = \dfrac{|A'B'|}{|\gamma_1|}$

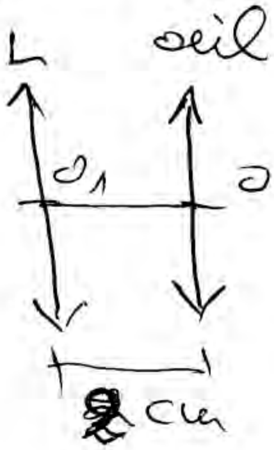
$\cancel{|A'B'|} = \quad \longrightarrow |AB| = \dfrac{0{,}4}{0{,}8} \quad |AB| = 0{,}5$ cm

$d = 0{,}5$ cm

107/ $OPR = -1m \longrightarrow$ myope

108/ $C = \frac{1}{OPR} - \frac{1}{OPR_C}$ $OPR_C = -\infty$ $C = -1\,\delta$

109/



OPR
(−100cm)

$C' = \frac{1}{O_1PR} - \cancel{\frac{1}{O_1PR_C}} \to 0$

$C' = \frac{1}{-98\,10^{-2}}$ $C' = -1{,}02$

110/ $A = 2{,}5\,\delta$ $A = \frac{1}{OPR} - \frac{1}{OPP}$

$\frac{1}{OPP} = \frac{1}{OPR} - A \longrightarrow \frac{1}{OPP} = \frac{1}{-1} - 2{,}5 \longrightarrow OPP = -0{,}29\,m$

$C = \frac{1}{OPP} - \frac{1}{OPP_c} \longrightarrow \frac{1}{OPP_C} = \frac{1}{OPP} - C$

$\frac{1}{OPP_c} = \frac{1}{-0{,}29} - (-1)$ $OPP = -0{,}40\,m$ $d = 40\,cm$

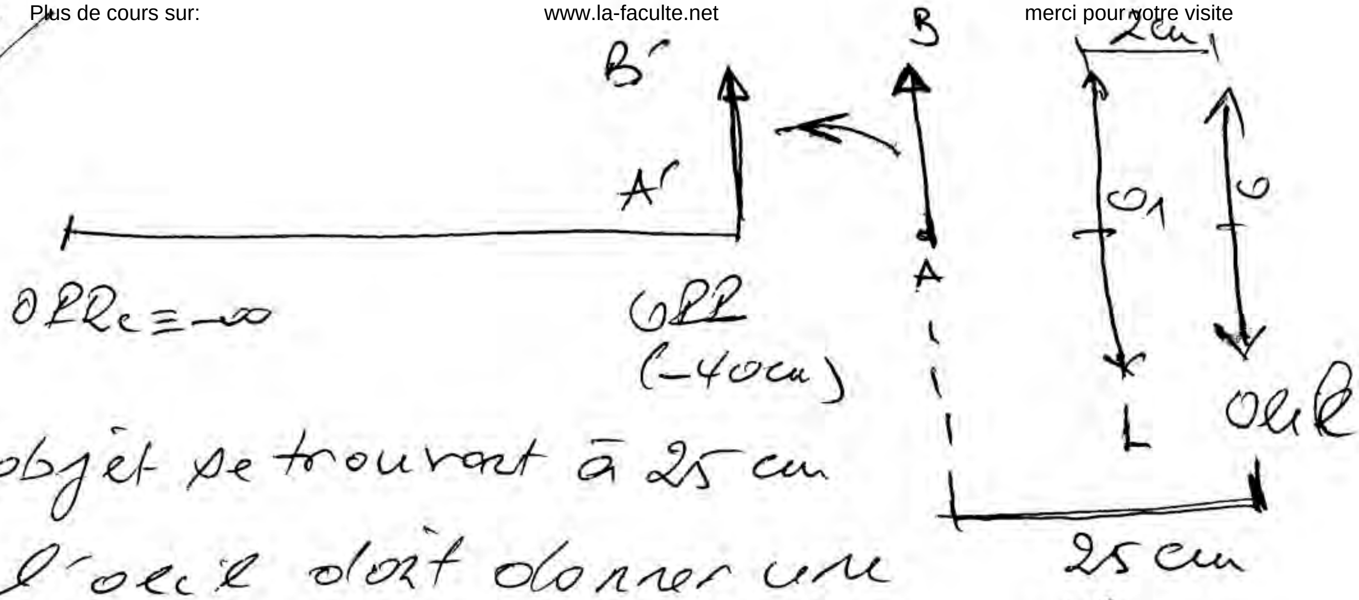
ou bien on a $A = \frac{1}{OPR} - \frac{1}{OPP_C}$ $OPR_c = -\infty$

$\to A = -\frac{1}{OPP_c} \longrightarrow OPP_c = -\frac{1}{A}$ $OPP_c = -\frac{1}{2{,}5}$

$\to OPP = -0{,}4\,m$

$\to OG = 40\,cm.$

111/



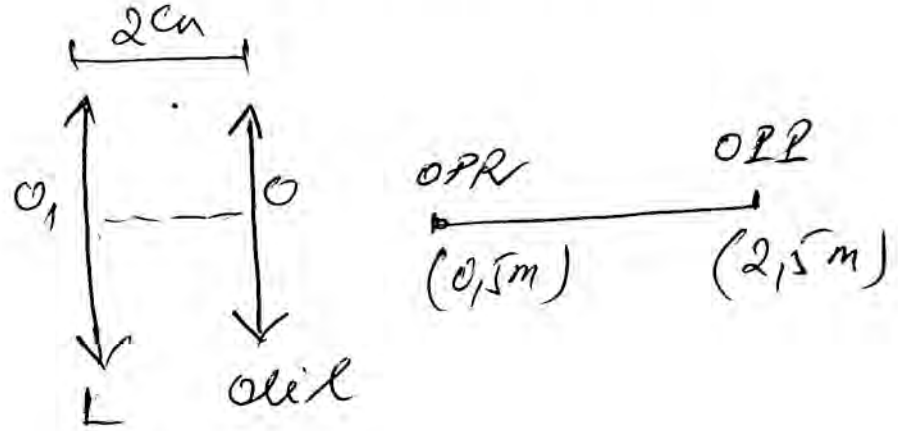
l'objet se trouvant à 25 cm de l'oeil doit donner une image au PP à 40cm de l'oeil

$$C = \frac{1}{O_1A'} - \frac{1}{O_1A} \longrightarrow C = \frac{1}{-38\,10^{-2}} - \frac{1}{-23 \cdot 10^{-2}}$$

$C = 1{,}7\cancel{2}\ \delta$

112/

oeil hypérope



113/ $C = \frac{1}{O_1PR} - \frac{1}{O_1PR_c}$ $\quad O_1PR_c \equiv -\infty$

$C = \frac{1}{0{,}52}$ $\quad C = 1{,}923\ \delta$

114/ $C = \frac{1}{O_1PP} - \frac{1}{O_1PP_c} \longrightarrow \frac{1}{O_1PP_c} = \frac{1}{O_1PP} - C$

$$\frac{1}{O_1PP_c} = \frac{1}{2{,}52} - 1{,}923 \longrightarrow O_1PP_c = -0{,}655$$

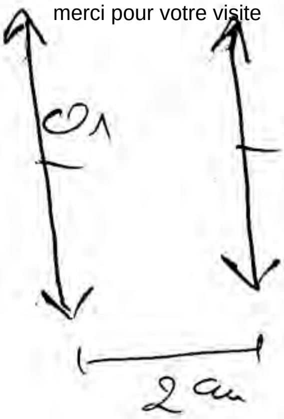
Champ corrigé

$]\,OPR_c\,,\,OPP_c\,]$

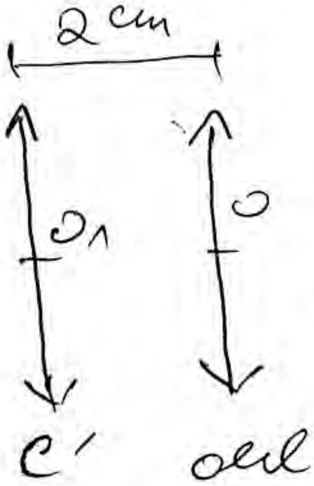
$]-\infty\,,\,-67{,}52\,cm]$

O_1PP_c

$(-65{,}52\,cm)$



115/



OPR OPP

(0,5m) (2,5m)

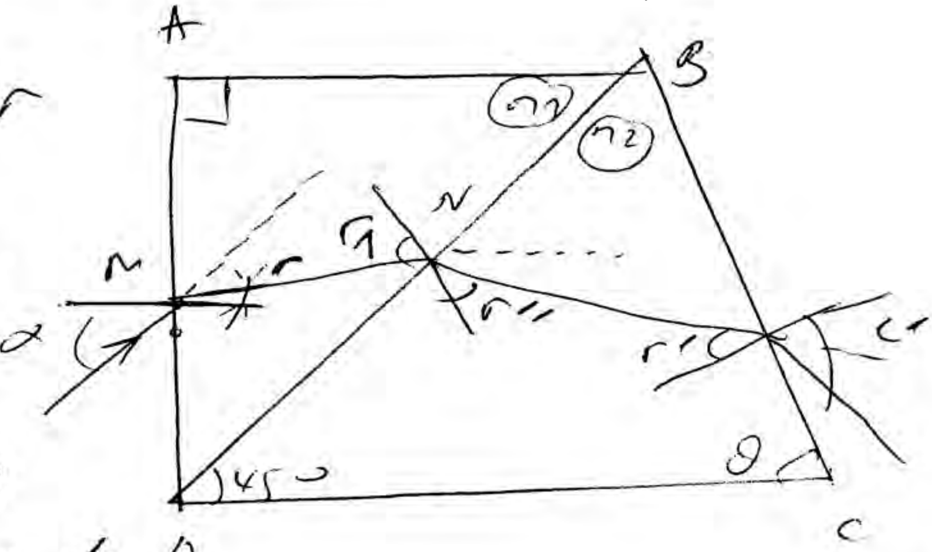
$$C' = \frac{1}{O_1PR} - \frac{1}{O_1PR_c}$$

$$\frac{1}{O_1PR_c} = \frac{1}{O_1PR} - C'$$

$$\frac{1}{O_1PR_c} = \frac{1}{0{,}52} - 1{,}2 \longrightarrow O_1PR_c = 1{,}383\,m$$

$$C' = \frac{1}{O_1PP} - \frac{1}{O_1PP_c} \longrightarrow \frac{1}{O_1PP_c} = \frac{1}{O_1PP} - C'$$

$$\frac{1}{O_1PP_c} = \frac{1}{2{,}52} - 1{,}2 \longrightarrow O_1PP_c = -1{,}245\,m$$



116/
$n_0 \sin\alpha = n_1 \sin r$

$\sin r = \frac{n_0}{n_1}\sin\alpha$

$\sin r = \frac{1}{1{,}25}\sin 30$

$\rightarrow r = 23{,}58°$

117/ Calcul de r_1

dans le triangle D
DMN ($B + 90 + r + 90 - r_1 = 180 \rightarrow r_1 = 68{,}58°$

l'indice n_1 étant inférieur à n_2 il y aura réfraction

118/ $r'' = ?$ $n_1 \sin r_1 = n_2 \sin r'' \rightarrow \sin r'' = \frac{1{,}25}{1{,}7}\sin 68{,}5$

$\rightarrow r'' = 43{,}19°$

$r'' + r' = B$ avec $B + 45 + \theta = 180$

$\rightarrow B = 75°$

$r' = B - r'' \rightarrow r' = 31{,}38°$

119/ $n_0 \sin i' = n_2 \sin r'$ $\sin i' = \frac{1{,}7}{1}\sin 31{,}8° \rightarrow i' = 63{,}63$

120/ $D = (\alpha - r) + (r_1 - r'') + (i' - r')$

$D = (30 - 23{,}57) + (68{,}53 - 43{,}19) + (63{,}63 - 31{,}8°)$

$D = 63{,}63°$

121/ $n_1 \sin r_1 = n_2 \sin r'' \rightarrow \sin r'' = \frac{1{,}25}{2{,}7}\sin 68{,}58$

$\rightarrow r'' = 25{,}53°$

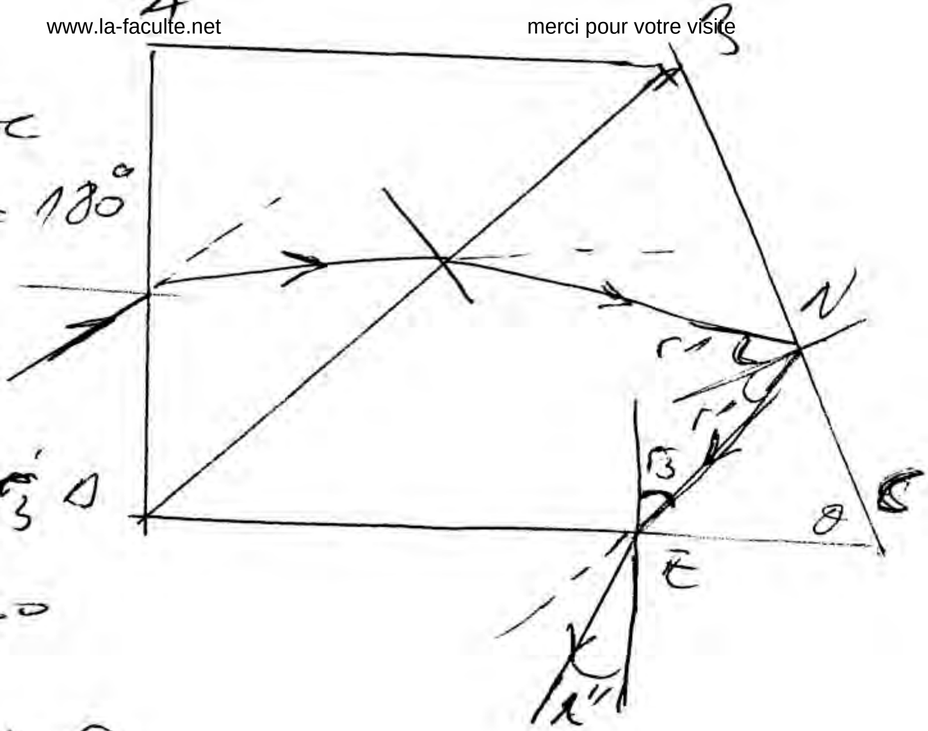
$r' + r'' = B \rightarrow r' = 49{,}47°$

$n_0 \sin i' = n_2 \sin r' \rightarrow \sin i' = \frac{2{,}7}{1}\cos 49{,}47°$

$\sin i' = 2{,}05$ impossible pas de réfraction alors il y a réflexion sur BC

/34

122/ $i'' = ?$



Dans le Δ NEC

$$\frac{\pi}{2} - r' + \theta + \frac{\pi}{2} - r_3 = 180°$$

$$\rightarrow r_3 = 10,53°$$

$$n_0 \sin i'' = n_2 \sin r_3$$

$$\rightarrow \cancel{i'' = 20,56°}$$

$$\sin i'' = \frac{n_2}{n_0} \sin r_3$$

$$\sin i'' = \frac{2,7}{1} \sin 10,53°$$

$$\rightarrow i'' = 20,56°$$

123/ $R_1 > 0 \quad R_2 < 0$

$$R_1 = -R_2$$

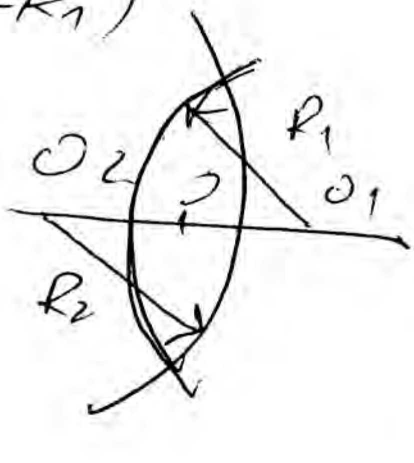
$$C = \frac{1}{OF'} = \left(\frac{n'}{n_0} - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$$

$$C = \frac{1}{OF'} = \left(\frac{n'}{n_0} - 1\right)\left(\frac{1}{R_1} - \frac{1}{-R_1}\right)$$

$$C = \frac{1}{OF'} = \left(\frac{n'}{n_0} - 1\right)\left(\frac{2}{R_1}\right)$$

$$\rightarrow \frac{1}{OF'} = \left(\frac{n'}{n_0} - 1\right)\frac{2}{R_1}$$

$$\rightarrow n' = 2,21$$



124/ $n_2 = 3,2$

$$\frac{1}{OF'} = \left(\frac{2,21}{3,2} - 1\right)\left(\frac{2}{30}\right) \rightarrow OF' \simeq -48,48\ \text{cm}$$

125/ $C = -0,5\ \delta < 0 \rightarrow$ Myope

126/ $C = \frac{1}{OPR} - \frac{1}{OPR_c}$ $\quad OPR_c = -\infty \quad OPR = \frac{1}{C}$

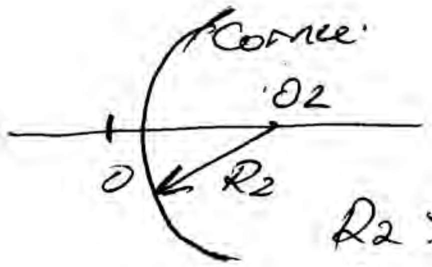
$$OPR = \frac{1}{-0,5} \qquad OPR = -2\ m$$

127/ $C = \frac{1}{OPP} - \frac{1}{OPP_c} \rightarrow \frac{1}{OPP_c} = C + \frac{1}{OPP}$

$$\frac{1}{OPP} = -0,5 + \frac{1}{-0,4} \longrightarrow OPP = -33,3\ \text{cm}.$$

128/

$$C = \left(\frac{n}{n_0} - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$$



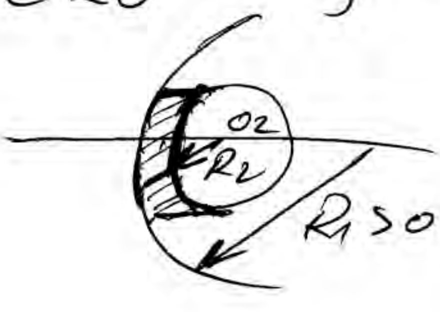
$R_2 > 0$
$R_2 = 10\ mm$

$$\frac{1}{R_1} - \frac{1}{R_2} = \frac{C}{\frac{n}{n_0} - 1}$$

$$\frac{1}{R_1} = \frac{1}{R_2} + \frac{C}{\frac{n}{n_0} - 1} \longrightarrow \frac{1}{R_1} = \frac{1}{10\ 10^{-3}} + \frac{-0,5}{\frac{1,5}{1} - 1}$$

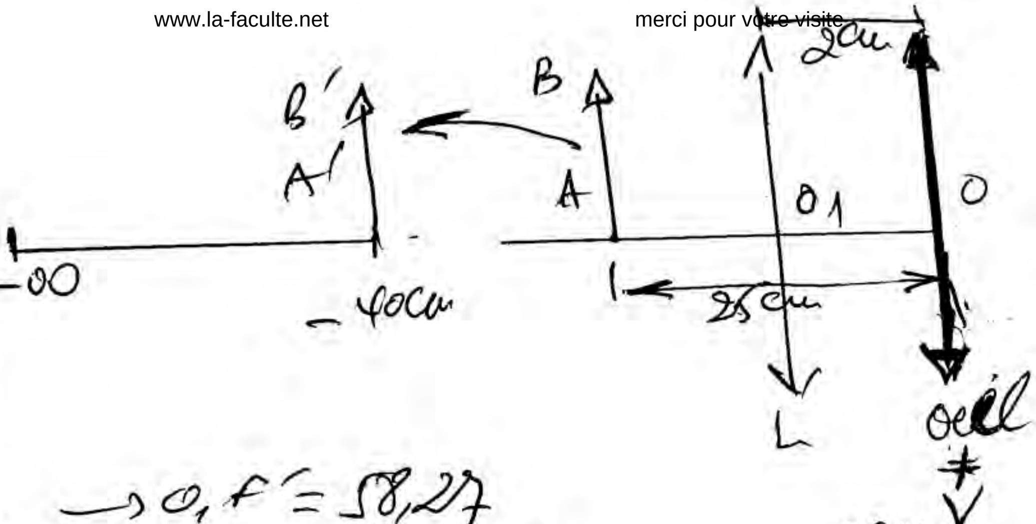
$R_1 = 0,0101 \qquad R_1 = 10,1\ mm.$

$\left.\begin{array}{l} R_1 > 0 \text{ et } R_2 \\ C < 0 \end{array}\right\} \rightarrow$ ménisque divergent



36

129/



$AB \xrightarrow{L} A'B'$

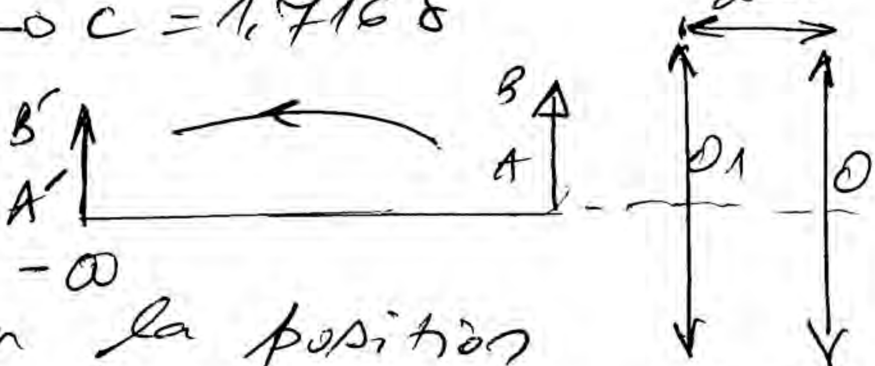
$A \xrightarrow[O_1F'_1]{O_1} A'$

$$\frac{1}{O_1F'} = \frac{1}{O_1A'} - \frac{1}{O_1A}$$

$$\frac{1}{O_1F'} = \frac{1}{-38} - \frac{1}{-23} \rightarrow O_1F' = 58{,}27$$

$$\rightarrow C = 1{,}7168$$

130/



Il s'agit de trouver la position de l'objet tel que l'image A'B' soit à l'infini

$AB \longrightarrow A'B'$

$A \xrightarrow[O_1F']{O_1} A'$ $\quad \frac{1}{O_1F'} = \frac{1}{O_1A'} - \frac{1}{O_1A} \rightarrow \frac{1}{O_1A} = \frac{1}{O_1A'} - \frac{1}{O_1F'}$

$$\frac{1}{O_1A} = \frac{1}{\infty} - \frac{1}{58{,}27} \rightarrow O_1A = -58{,}27 \rightarrow OA = -60{,}27 \text{ cm}$$

131/ $O_1O_2 = \Delta + O_1F'_1 + O_2F'_2$

$O_1F'_1 = \frac{1}{C_{ob}}$ $\quad O_1F'_1 = \frac{1}{100}$ $\quad O_1F'_1 = 0{,}01$ m $\quad O_1F'_1 = 1$cm.

$O_2F'_2 = \frac{1}{C_{oc}}$ $\quad O_2F'_2 = \frac{1}{25}$ $\quad O_2F'_2 = 0{,}04$ m $\quad O_2F'_2 = 4$cm

$G_c = \frac{P_i}{4}$ $\quad G_c = \frac{\Delta . C_{ob} . C_{oc}}{4} \rightarrow \Delta = \frac{4 G_c}{C_{ob} . C_{oc}}$ $\quad \Delta = \frac{4 \times 100}{100 \; 25}$

$\Delta = 0{,}16$ m $\quad \Delta = 16$ cm

$O_1O_2 = 16 + 1 + 4$ $\quad O_1O_2 = 21$ cm $\quad H = 21$ cm

132/ $P = \frac{\alpha''}{|AB|} \rightarrow \alpha'' = P . AB$ vision à l'infini $\rightarrow P = P_i$.

$P_i = \Delta . C_{ob} . C_{oc}$ $\quad P_i = 400\delta \rightarrow \alpha'' = 400 \times 10 \; 10^{-6}$ $\quad \alpha'' = 4 \; 10^{-3}$ rad

133/ AB virtuel $\rightarrow \overline{OA} > 0 \rightarrow \overline{OA} = +20\,cm$

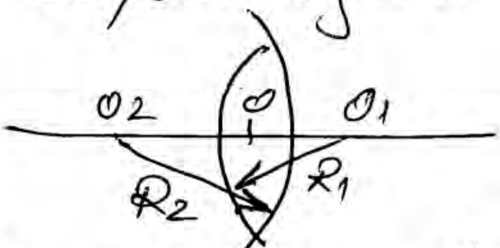
A'B' Réelle $\rightarrow \overline{OA'} > 0 \rightarrow \overline{OA'} = 10\,cm$

$$\frac{1}{\overline{OF'}} = \frac{1}{\overline{OA'}} - \frac{1}{\overline{OA}} \qquad \frac{1}{\overline{OF'}} = \frac{1}{10} - \frac{1}{20} \rightarrow \overline{OF'} = +20\,cm$$

$$C = \frac{1}{\overline{OF'}} \qquad C = \frac{1}{20\,10^{-2}} \qquad C = 5\ \delta$$

134/ $C > 0$ + Rayons égaux $\rightarrow$ biconvexe

135/



$R_1 > 0$

$R_2 < 0$

$R_2 = -R_1$

$$C = \frac{1}{\overline{OF'}} = \left(\frac{n}{n_0} - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$$

$$C = \frac{1}{\overline{OF'}} = \left(\frac{n}{n_0} - 1\right)\left(\frac{2}{R_1}\right) \rightarrow R_1 = 2\left(\frac{n}{n_0} - 1\right)\overline{OF'}$$

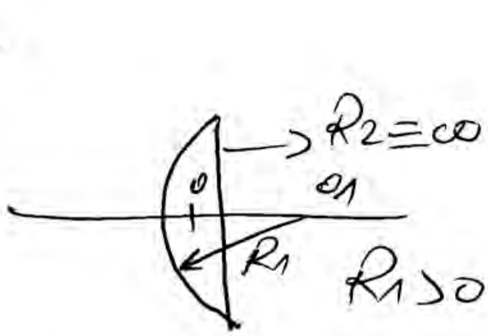
$$R_1 = 2\left(\frac{1{,}5}{1} - 1\right) 20 \rightarrow R_1 = 20\,cm.$$

136/ Soleil $\rightarrow \overline{OA} = -\infty$ Image à 5 cm $\rightarrow \overline{OA'} = +5\,cm$

$$\frac{1}{\overline{OA'}} - \frac{1}{\overline{OA}} = \frac{1}{\overline{OF'}}$$

$\rightarrow \overline{OF'} = \overline{OA'} \qquad \overline{OF'} = 5\,cm$

$$\frac{1}{\overline{OF'}} = \left(\frac{n}{n_0} - 1\right)\left(\frac{1}{R_1} - \underbrace{\cancel{\frac{1}{R_2}}}_{\rightarrow 0}\right)$$



$$R_1 = \overline{OF'} \cdot \left(\frac{n}{n_0} - 1\right)$$

$$R_1 = 5\left(\frac{1{,}5}{1} - 1\right) \rightarrow R_1 = 2{,}5\,cm.$$

137/ $\mathbf{n}_1 = 1{,}5$

$OA < 0$ car objet réel
$OA' < 0$ car Image virtuelle $\Big\} \to \gamma > 0$

$|A'B'| = 2|AB| \to \frac{|A'B'|}{|AB|} = 2 \to |\gamma| = 2$

$\to \gamma = +2.$

$$\frac{1}{OF'} = \frac{1}{OA'} - \frac{1}{OA}$$

$OA' = -25\text{ cm} \to \cancel{OA = \gamma \cdot OA} \quad \cancel{OA' = 50\text{ cm}}$

$\gamma = \frac{OA'}{OA} \to OA = \frac{OA'}{\gamma} \quad OA = \frac{-25}{2} \quad OA = -12{,}5$

$$\frac{1}{OF'} = \frac{1}{-25} - \frac{1}{-12{,}5} \to OF' = 25\text{ cm}$$

$C = \frac{1}{25\,10^{-2}} \quad C = 4\ \delta$

138) $C > 0$ + Rayons égaux $\to$ biconvexe

$$C = \frac{1}{OF'} = \left(\frac{n}{n_0} - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right) \quad R_2 = -R_1$$

$$\frac{1}{OF'} = \left(\frac{n}{n_0} - 1\right)\left(\frac{2}{R_1}\right) \to R_1 = 2 \cdot OF'\left(\frac{n}{n_0} - 1\right)$$

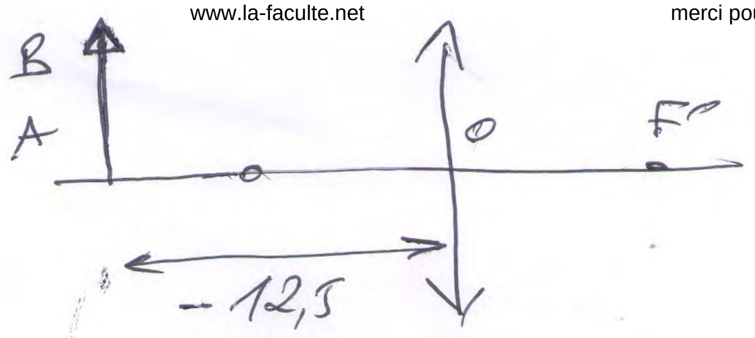
$R_1 = 2 \cdot 25\left(\frac{1{,}5}{1} - 1\right) \quad R_1 = 25\text{ cm}$

139/ $C_T = C_1 + C_2 - a \times C_1 \cdot C_2$ L. accolées $\to a = 0$

$C_T = C_1 + C_2 \quad C_T = 4 + 16 \quad C_T = 20\ \delta$

$OF' = \frac{1}{C_T} \quad OF' = \frac{1}{20} \quad OF' = 5\text{ cm}.$

140/ $OF' = 5\,cm$



$$\frac{1}{OA'} - \frac{1}{OA} = \frac{1}{OF'}$$

$$\frac{1}{OA'} = \frac{1}{OF'} + \frac{1}{OA} \longrightarrow \frac{1}{OA'} = \frac{1}{5} + \frac{1}{-12,5}$$

$$OA' = 8,33\ cm$$

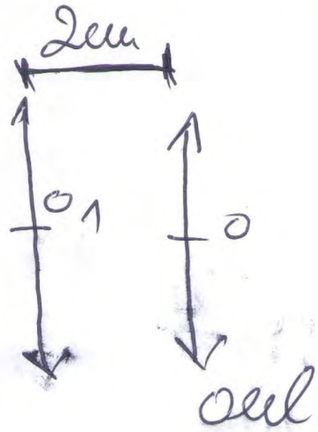
141/ OPP réel $OPP = -12,5\,cm$. $A = 7\,\delta$

$$A = \frac{1}{OPR} - \frac{1}{OPP} \rightarrow \frac{1}{OPR} = A + \frac{1}{OPP}$$

$$\frac{1}{OPR} = 7 + \frac{1}{-12,5\,10^{-2}}$$

~~OPR = −13,7 cm~~ → Myope

$OPR = -1\,m$



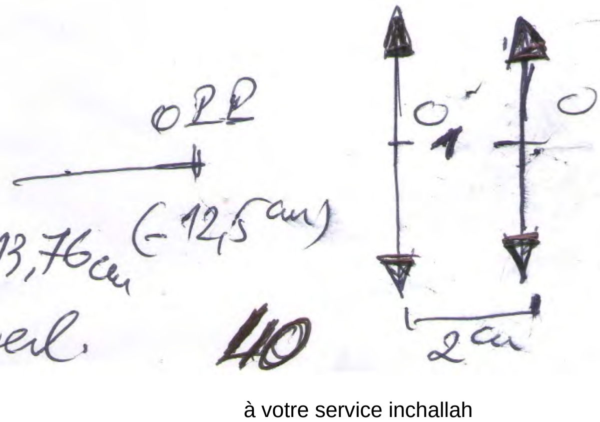
142/ $C = \frac{1}{O_1PR} - \frac{1}{O_1PR_C}$ $O_1PR_C = -\infty$

$$C = \frac{1}{O_1PR} \qquad \cancel{C = \frac{1}{-13,7\,10^{-2}}} \qquad \cancel{C = -7,3\,\delta}$$

$$C = \frac{1}{-0,98} \qquad C = -1,02\ \delta$$

143/ $C = \frac{1}{O_1PP} - \frac{1}{O_1PP_C} \longrightarrow \frac{1}{O_1PP_C} = \frac{1}{O_1PP} - C$

$$\frac{1}{O_1PP_C} = \frac{1}{-10,5\,10^{-2}} - (-1,02)$$



$O_1PP_C = -11,76 \longrightarrow OPP_C = -13,76\,cm$

donc 13,76 avant l'oeil.

41

144/ $C = \frac{1}{OPR} - \frac{1}{OPR_c} \rightarrow OPR_c = -\infty$

$C = \frac{1}{OPR} \quad C = \frac{1}{-1} \quad C = -1\,\delta$

$C = \frac{1}{ORR} - \frac{1}{ORR_c} \rightarrow \frac{1}{ORR_c} = \frac{1}{ORR} - C$

$\frac{1}{ORR_c} = \frac{1}{-12{,}5\,10^{-2}} - (-1) \rightarrow ORR_c = -14{,}29\,cm$

donc 14,29 cm avant l'oeil.

145/ $OPR = -\infty$

$A = \frac{1}{OPR} - \frac{1}{ORR} \quad ORR = -\frac{1}{A} \quad ORR = -\frac{1}{7}$

$\frac{1}{OPR} \rightarrow 0$

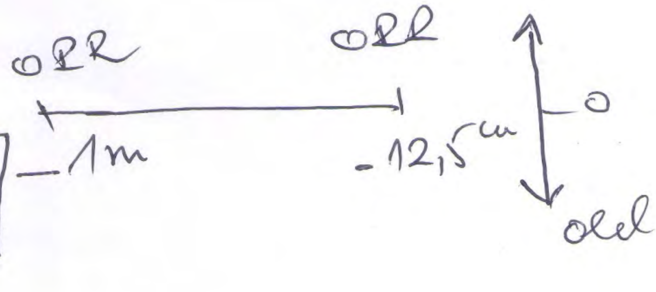
$ORR = -14{,}29\,cm$

donc 14,29 cm avant l'oeil

146/ $C_{max} = \frac{1}{OT} - \frac{1}{ORR} \quad C_{max} = \frac{1}{17\,10^{-3}} - \frac{1}{-14{,}29\,10^{-2}}$

$C_{max} = 65{,}82\,\delta$

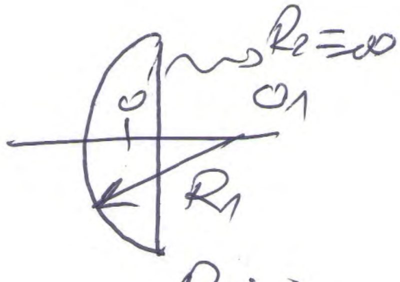
147/



$L = (O_1F')^2 \left[\frac{1}{OPR + a} - \frac{1}{ORR + a}\right]$

$a = 0$ (oeil sur F')

$C = \frac{1}{O_1F} = \left(\frac{n_1}{n_0} - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$



$\frac{1}{O_1F'} = \left(\frac{1{,}5}{1} - 1\right)\left(\frac{1}{0{,}02} - \frac{1}{\infty}\right)$

$R_1 > 0$

$O_1F' = 4\,cm$ $\qquad R_1 = 2\,cm$

$L = (4)^2 \left[\frac{1}{-100} - \frac{1}{-12,5}\right]$ $L = 1,12\,cm$
$L = 11,2\,mm$

148/ $P = C\left(1 - \frac{a}{d}\right)$ $a = 0 \rightarrow P = C$

$P = \frac{1}{0,f'}$ $P = \frac{1}{0,04}$ $P = 25\,\delta$

149/ $G = P \times |0PP|$ $G = 25 \times |12,5\,10^{-2}|$

$G = 3,125$

150/ $n_1 = 1,5$

objet réel → $OA < 0 \rightarrow OA = -30\,cm$

Image virtuelle → $OA' < 0 \rightarrow OA' = -15\,cm$

$C = \frac{1}{OF'}$

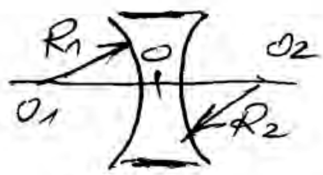
$\frac{1}{OF'} = \frac{1}{OA'} - \frac{1}{OA} \longrightarrow \frac{1}{OF'} = \frac{1}{-15} - \frac{1}{-30}$

~~OF = -3,33 cm~~ $OF' = -30\,cm$

$C = \frac{1}{-30\,10^{-2}}$ $C = -3,33\,\delta$

151/ $C < 0$ et rayons égaux → biconcave

152/ $C = \left(\frac{n_1}{n_0} - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$



$C = \left(\frac{n_1}{n_0} - 1\right)\left(\frac{1}{R_1} - \frac{1}{-R_1}\right)$

$R_1 < 0$
$R_2 < 0$
$|R_1| = |R_2|$

$C = \left(\frac{n_1}{n_0} - 1\right)\left(\frac{2}{R_1}\right) = \frac{1}{OF'}$

$R_1 = 2\left(\frac{n_1}{n_0} - 1\right) OF'$ $\rightarrow R_2 = -R_1$

$R_1 = 2\left(\frac{1,5}{1} - 1\right) \times (-30) \longrightarrow R_1 = -30\,cm$

$\rightarrow R = 30\,cm$

153/ Soleil $\rightarrow$ $\overline{OA} \equiv -\infty$ $\quad \overline{OA'} = 4\,cm$

$$\frac{1}{\overline{OF'}} = \frac{1}{\overline{OA'}} - \cancel{\frac{1}{\overline{OA}}} \qquad \overline{OF'} = \overline{OA'} = 4\,cm$$

$$\frac{1}{\overline{OF'}} = \left(\frac{n}{n_0} - 1\right)\left(\frac{1}{R_1} - \cancel{\frac{1}{R_2}}\right)$$

$$R_1 = \overline{OF'}\left(\frac{n}{n_0} - 1\right)$$

$$R_1 = 4\left(\frac{1{,}5}{1} - 1\right) \rightarrow R_1 = 2\,cm.$$

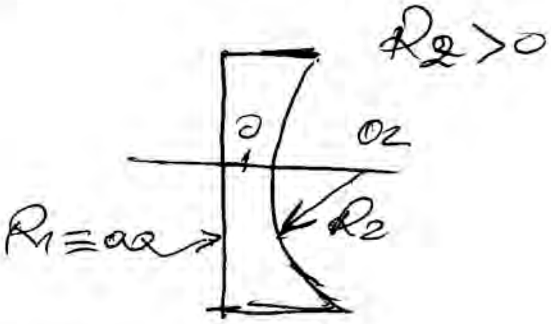
$R' = 2\,cm.$

154/

AB virtuel $\rightarrow$ $\overline{OA} > 0$

Image droite $\rightarrow \gamma > 0$

$\rightarrow$ $\overline{OA'} > 0 \rightarrow$ A'B' est réelle



γ $|A'B'| = 2\,|AB| \rightarrow |\gamma| = 2$

$\gamma > 0 \rightarrow \gamma = +2$

$$\frac{1}{\overline{OF'}} = \left(\frac{n}{n_0} - 1\right)\left(\cancel{\frac{1}{R_1}} - \frac{1}{R_2}\right) \qquad R_1 \equiv \infty \quad R_2 = 10\,cm$$

$$\frac{1}{\overline{O_1F'_1}} = \left(\frac{n}{n_0} - 1\right)\left(-\frac{1}{R_2}\right)$$

$$\frac{1}{\overline{O_1F'_1}} = \left(\frac{1{,}5}{1} - 1\right)\left(-\frac{1}{10}\right) \rightarrow \overline{O_1F'_1} = -20\,cm$$

$$C_1 = \frac{1}{\overline{O_1F'}} \qquad C_1 = \frac{1}{-0{,}2} \qquad C_1 = -5\,\delta$$

155/ $AB \xrightarrow{L_1} A_1B_1$

$$A \xrightarrow[O_1F'_1]{O_1} A_1 \qquad \frac{1}{\overline{O_1F'_1}} = \frac{1}{\overline{O_1A_1}} - \frac{1}{\overline{O_1A}}$$

$\gamma_1 = \frac{O_1A'}{O_1A} \rightarrow O_1A = \frac{O_1A'}{\gamma} \rightarrow O_1A = \frac{O_1A'}{2}$

$\frac{1}{O_1F_1'} = \frac{1}{O_1A'} - \frac{1}{\frac{O_1A'}{2}} \quad \frac{1}{O_1F'} = \frac{1-2}{O_1A'} = \frac{-1}{O_1A'}$

$O_1A' = -O_1F' \rightarrow O_1A' = -(-20)$

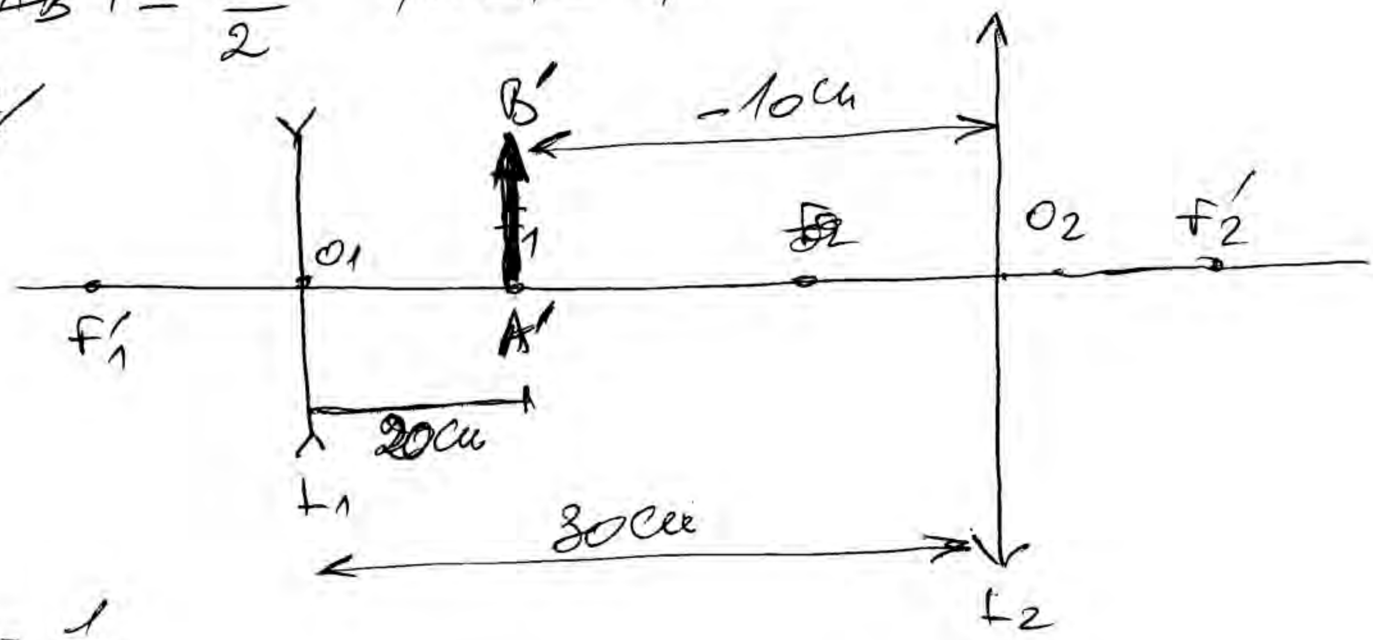
$O_1A' = +20\,cm$

156/ $|\gamma_1| = \frac{|A'B'|}{|AB|}$

$\rightarrow |A'B'| = |\gamma_1|\,|AB| \rightarrow |AB| = \frac{|A'B'|}{\gamma}$

$|AB| = \frac{5}{2} \quad |AB| = 2{,}5\,cm.$

157/



$C_2 = \frac{1}{O_2F_2'}$

$O_2F_2' = \frac{1}{10} \quad O_2F_2' = 0{,}1\,m \quad O_2F_2' = 10\,cm$

$A'B' \xrightarrow{L_2} A''B''$

$A' \xrightarrow[O_2F_2']{O_2} A'' \quad \frac{1}{O_2A''} - \frac{1}{O_2A'} = \frac{1}{O_2F_2'}$

$\frac{1}{O_2A''} = \frac{1}{O_2F_2'} + \frac{1}{O_2A'} \rightarrow \frac{1}{O_2A''} = \frac{1}{10} + \frac{1}{-10} = 0$

$\rightarrow O_2A'' \equiv -\infty$

ou bien directement puisque l'objet A'B' se trouve sur le foyer objet de la 2° lentille (lentille DV) -> A''B'' se trouve à l'infini.

158/ $C_T = C_2 + C_3$ $C = 10 - 20$ $C = -10\delta$

$\overline{O_2F'_2} = -\frac{1}{10} = -0,1m$

$\frac{1}{\overline{O_2A''}} - \frac{1}{\overline{O_2A'}} = \frac{1}{\overline{O_2F'_2}}$

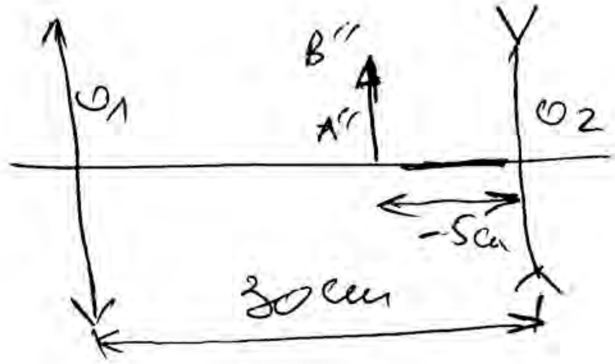
$\overline{O_2F'_2} = -10cm$

$\frac{1}{\overline{O_2A''}} = \frac{1}{\overline{O_2F'_2}} + \frac{1}{\overline{O_2A'}} \rightarrow \frac{1}{\overline{O_2A''}} = \frac{1}{-10} + \frac{1}{-10}$

$\frac{1}{\overline{O_2A''}} = \frac{-2}{10} \rightarrow \overline{O_2A''} = -5cm$

alors par rapport à O_1 elle se trouve à :

$\overline{O_1A''} = 25cm$



159/ $\overline{OPP} = -0,5m$

$A = \frac{1}{\overline{OPR}} - \frac{1}{\overline{OPP}} \rightarrow \frac{1}{\overline{OPR}} = A + \frac{1}{\overline{OPP}}$

$\frac{1}{\overline{OPR}} = 4,5 + \frac{1}{-0,5}$ $\overline{OPR} = 0,4m > 0$

-> hypérope

160/ $C = \frac{1}{OPR} + \frac{1}{OPR_C}$ $\quad OPR_C \equiv -\infty$

$C = \frac{1}{0,4}$ $\quad C = 2,5\ \delta$

161/ $C = \frac{1}{OPP} - \frac{1}{OPP_C} \longrightarrow \frac{1}{OPP_C} = \frac{1}{OPP} - C$

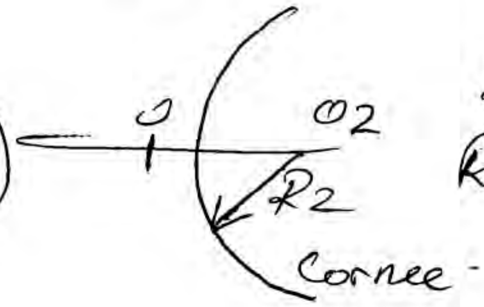
$\frac{1}{OPP_C} = \frac{1}{-0,5} - 2,5 \longrightarrow OPP_C = -0,222$

$OPP_C = -22,22$ cm

donc OPP_C est 22,22 cm de l'oeil.

162/

$C = \frac{1}{OF'} = \left(\frac{n}{n_0} - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$



$R_2 > 0$
$R_2 = 7$ mm

$\frac{1}{R_1} = \frac{C}{\frac{n}{n_0} - 1} + \frac{1}{R_2}$

$\frac{1}{R_1} = \frac{2,5}{\frac{1,5}{1} - 1} + \frac{1}{7\,10^{-3}}$ $\quad R_1 = 6,76$ mm

$R_1 = 6,7$ mm.

163/ $A = \frac{1}{OPR} - \frac{1}{OPP} \rightarrow OPR \equiv \infty$ (emmétropes)

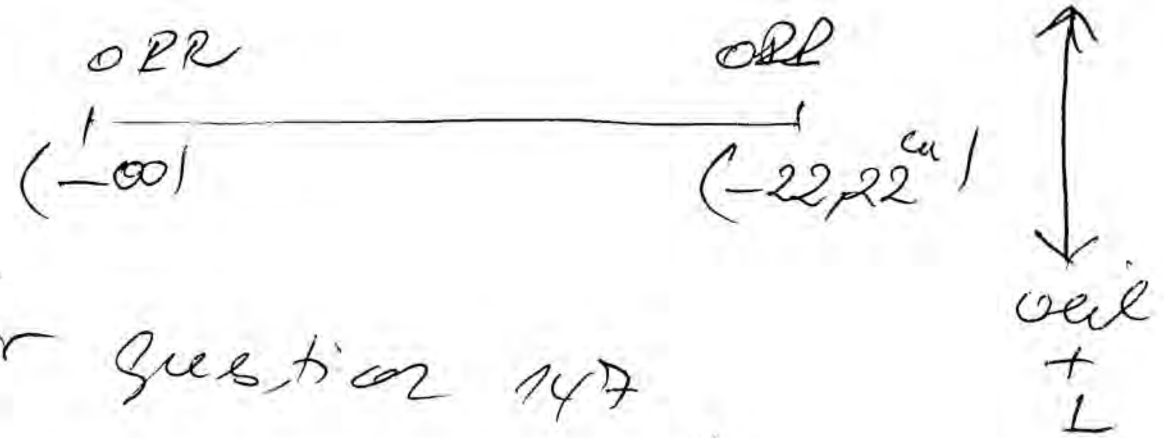
$\rightarrow OPP = -\frac{1}{A}$ $\quad OPP = -\frac{1}{4,5}$ $\quad OPP = -22,22$ cm

$\rightarrow$ 22,22 cm de l'oeil

164/ $C_{max} = \frac{1}{OT} - \frac{1}{OPP}$

$C_{max} = \frac{1}{17\,10^{-3}} - \frac{1}{-22,22\,10^{-2}}$ $\quad C_{max} = 63,32\ \delta$

165/



voir question 147

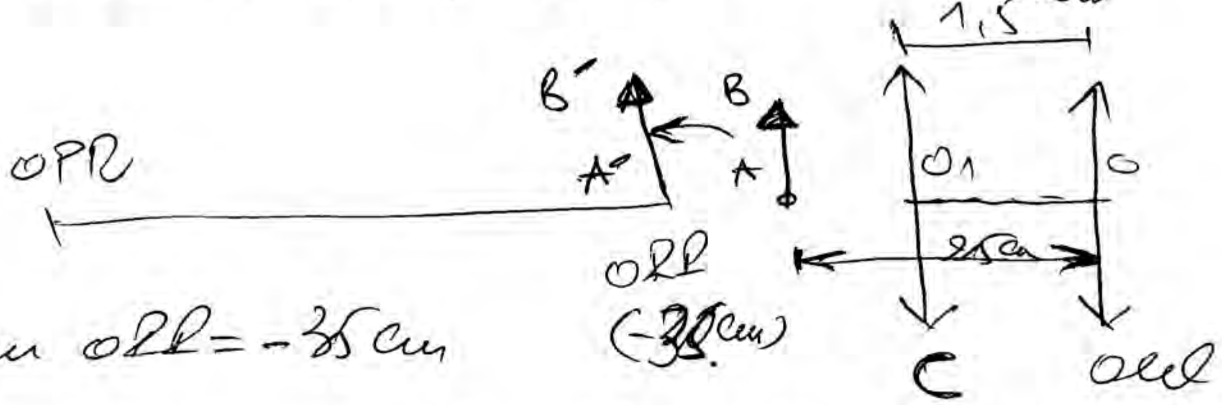
167/ $A = 5\,\delta$ $\quad A = \frac{1}{OPR} - \frac{1}{OPP}$

emmétrope $\rightarrow OPR \equiv \infty$ $\quad OPP = -\frac{1}{A}$

$OPP = -\frac{1}{5}$ $\quad OPP = -0{,}2\,m$

OPP = 20 cm en avant de l'oeil.

168/



nouveau $OPP = -35\,cm$

l'objet à 25 cm de l'oeil doit donner une image au PP, car la vision se fait avec accommodation maximale.

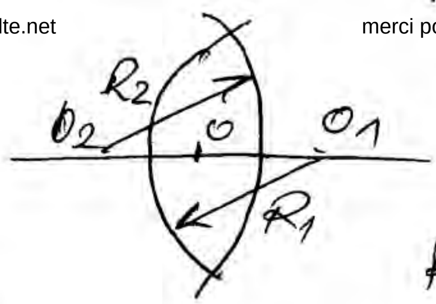
$$\frac{1}{O_1F'} = \frac{1}{O_1A'} - \frac{1}{O_1A} \qquad \frac{1}{O_1F'} = \frac{1}{-33{,}5} - \frac{1}{-23{,}5}$$

$O_1F' = 78{,}72\,cm \rightarrow C = 1{,}27\,\delta$

169/

$n_1 = 1,52$ $\quad C = 58,82$

$n = 1,33$



$R_1 > 0$

$R_2 > 0$

$R_1 = -R_2$

$$C = \left(\frac{n_1}{n} - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$$

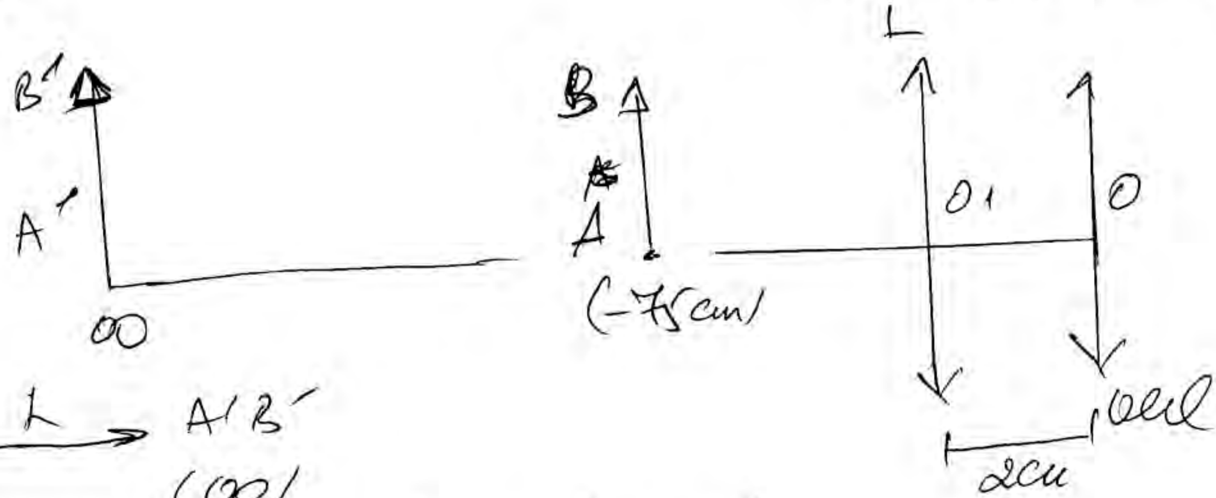
$$C = \left(\frac{n_1}{n} - 1\right)\frac{2}{R_1} \longrightarrow R_1 = \left(\frac{n_1}{n} - 1\right)\frac{2}{C}$$

$$R_1 = \left(\frac{1,52}{1,33} - 1\right)\frac{2}{58,82}$$

$R_1 = 4,85\ mm$

$\ell = 0,485\ cm$

170/



$AB \xrightarrow{L} A'B'$ (∞)

$A \xrightarrow[O_1F']{O_1} A'$ $\quad \dfrac{1}{O_1A'} - \dfrac{1}{O_1A} = \dfrac{1}{O_1F'}$

$$\frac{1}{O_1F'} = \frac{1}{\infty} - \frac{1}{-0,73} \longrightarrow \frac{1}{O_1F'} = 1,37 \longrightarrow C = 1,378$$

171/ voir 195

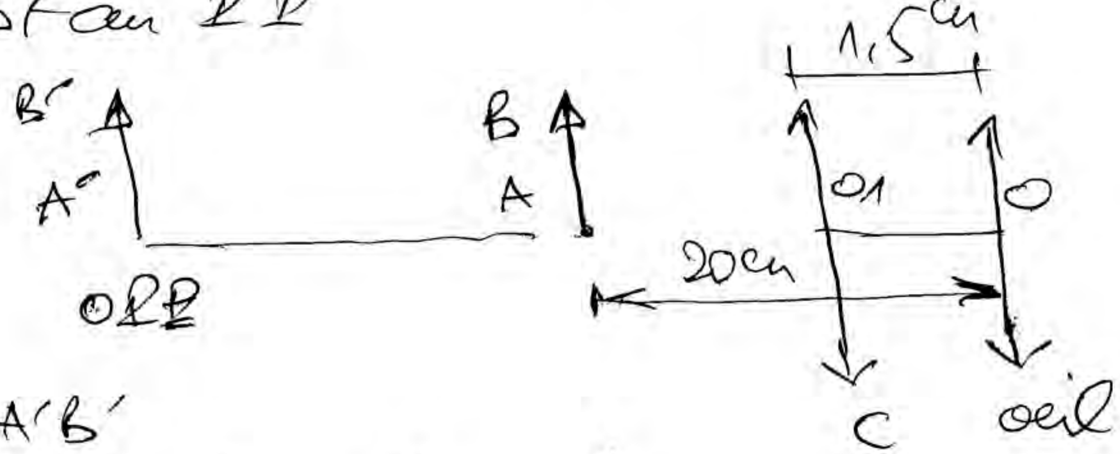
172/ voir 196

174/ $C = 6{,}25\ \delta > 0 \longrightarrow$ hyperop

175/
il voit l'image avec accommodation max
$\longrightarrow A'B'$ est au PP

$O_1F' = \frac{1}{6{,}25}$

$O_1F' = 16$ cm



$AB \longrightarrow A'B'$

$A \xrightarrow[O_1F']{O_1} A'$ $\quad \frac{1}{O_1F'} = \frac{1}{O_1A'} - \frac{1}{O_1A}$

$\frac{1}{O_1A'} = \frac{1}{O_1F'} + \frac{1}{O_1A}$ $\quad \frac{1}{O_1A'} = \frac{1}{16} + \frac{1}{-18{,}5}$

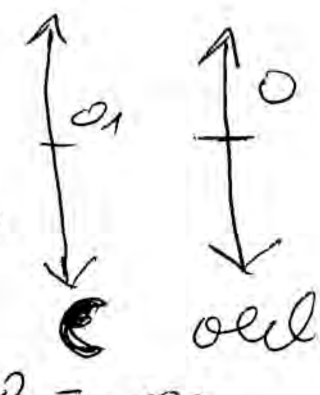
$O_1A' = 118{,}4$ cm $\quad O_1A' = 1{,}184$ m

$\longrightarrow O_1PP = O_1A' = 1{,}184$

$\longrightarrow OPP = 1{,}184 - 1{,}5\ 10^{-2}$ $\quad OPP = 116{,}9$ cm.

$O_1PP = 1{,}169$ m.

$\longrightarrow 1{,}169$ m de l'oeil



O_1PP = 118,4 cm

176/ emmétrope $\longrightarrow OPR = -\infty$

$A = \frac{1}{OPR} - \frac{1}{OPP}$ $\quad OPP = -\frac{1}{A}$

$OPP = -\frac{1}{5}$ $\quad OPP = -20$ cm

$G = P \times |OF'|$

$P = C\left(1 - \frac{a}{d}\right)$ $a = 0$ car oeil sur F'

$P = C$ $P = 6{,}25\ \delta$

$G = 6{,}25\ |-0{,}2|$ $G = 1{,}25$

177/ objet virtuel $\Rightarrow OA > 0$ $|AB| = 2cm.$

$OF' = 4cm.$

Image réelle $\Rightarrow OA' > 0$ $OA' = 20cm$

$|\gamma| = \frac{|A'B'|}{|AB|} \rightarrow |A'B'| = |\gamma| . |AB|$

$\gamma = \frac{OA'}{OA}$

$\frac{1}{OF'} = \frac{1}{OA'} - \frac{1}{OA} \rightarrow \frac{1}{OA} = \frac{1}{OA'} - \frac{1}{OF'}$

$\frac{1}{OA} = \frac{1}{20} - \frac{1}{4} \rightarrow OA = -5\,cm$

on trouve $OA < 0 \rightarrow$ objet réel donc

la lentille n'est pas CV $\rightarrow$ elle DV

$\rightarrow OF' = -4\,cm$

$\frac{1}{OA} = \frac{1}{OA'} - \frac{1}{OF'} \rightarrow \frac{1}{OA} = \frac{1}{20} - \frac{1}{-4}$

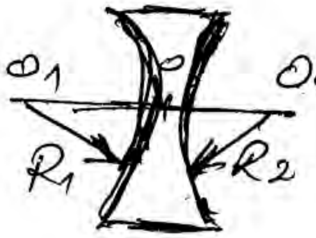
$OA = 3{,}33\,cm.$ $\gamma = \frac{OA'}{OA}$ $\gamma = \frac{20}{3{,}33} = 6$

$|A'B'| = 6 \times 2$ $|A'B'| = 12\,cm.$

178/ $\overline{OF'} < 0 \rightarrow$ L divergente

rayons égaux $\rightarrow$ biconcave

$$C = \frac{1}{\overline{OF'}} = \left(\frac{n}{n_0} - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$$



$R_1 < 0$

$R_2 > 0$

$R_1 = -R_2$

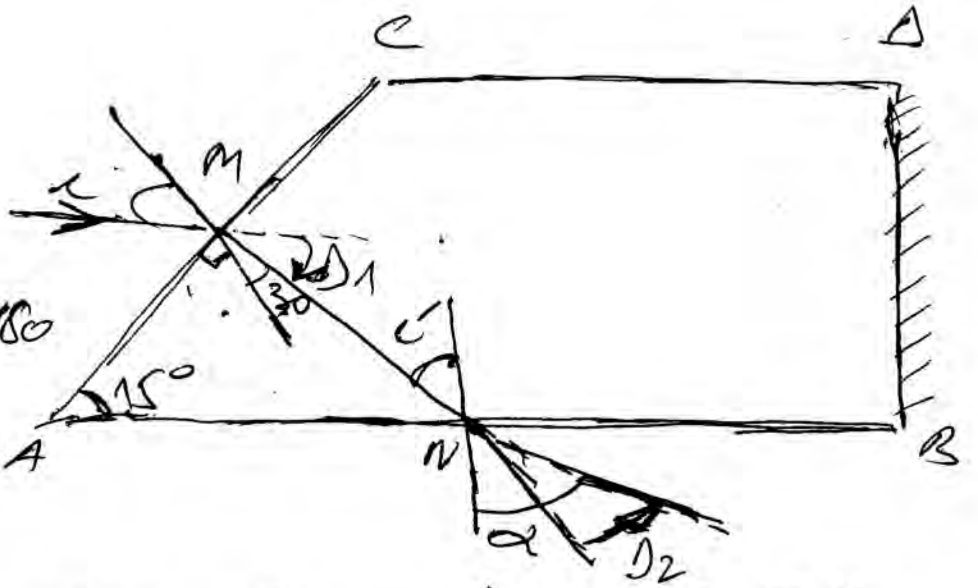
$$\frac{1}{\overline{OF'}} = \left(\frac{n}{n_0} - 1\right)\left(\frac{2}{R_1}\right)$$

$$\frac{n}{n_0} - 1 = \frac{R_1}{2(\overline{OF'})} \rightarrow n = n_0\left(1 + \frac{R_1}{2(\overline{OF'})}\right)$$

$$n = 1\left(1 + \frac{(-12)}{2(-4)}\right) \quad (R_1 = -12cm)$$

$n = 2,5$

178/



Calcul de i' :

Δ AMN

$15 + 90 + 30 + 90 - i' = 180$

$15 + 30 - i' = 0$

$i' = 45°$

$\sin \lambda_{AB} = \frac{n_0}{n_1} \quad \sin \lambda_{AB} = \frac{1}{1,3} \longrightarrow \lambda_{AB} = 50,7°$

$i' = 45° < \lambda_{AB} \longrightarrow$ réfraction au pt N

$n_1 \sin i' = n_0 \sin \alpha \quad \sin \alpha = \frac{n_1}{n_0} \sin i'$

$\sin \alpha = \frac{1,3}{1} \sin 45° \longrightarrow \alpha = 66,82°$

51

179/ $D_T = |D_1 - D_2|$ $D_1 = i - 30$ on calcule i

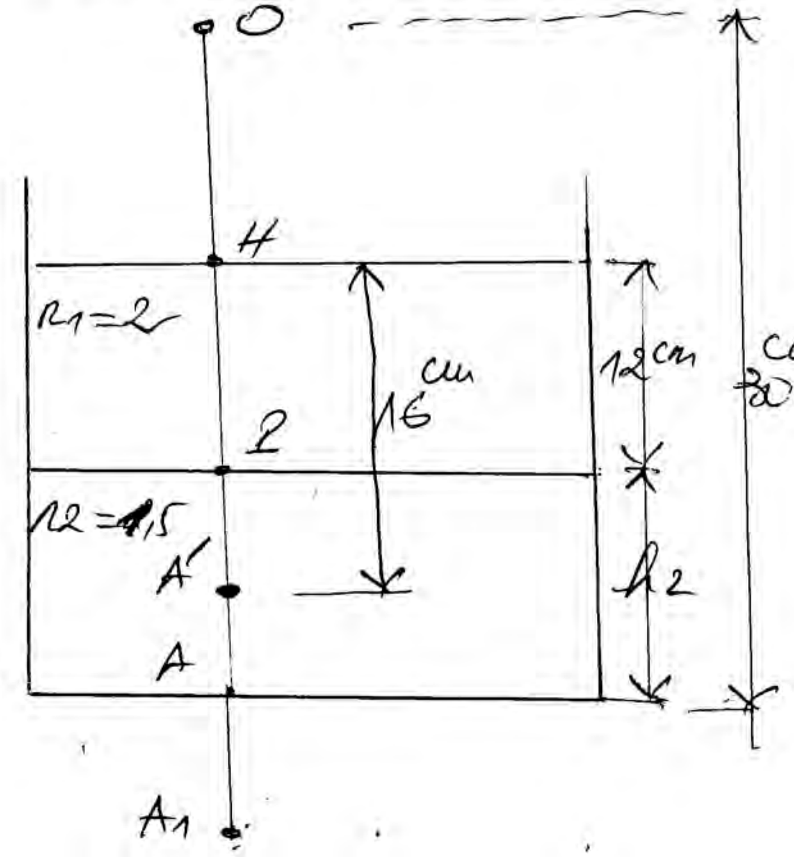
$20 \sin i = 2 \sin 30 \rightarrow i = 40,54°$

$D_1 = 40,54 - 30 \rightarrow D_1 = 10,54°$

$D_2 = \alpha - 45$ $D_2 = 21,82$

$D_T = 21,82 - 10,54$ $D_T = 11,28°$

180/



$$\underset{n_2}{A} \xrightarrow{P} \underset{n_1}{A_1} \xrightarrow{H} \underset{n_0}{A'}$$

$\frac{PA}{n_2} = \frac{PA_1}{n_1}$ $\frac{HA_1}{n_1} = \frac{HA'}{n_0}$

$\frac{h_2}{1,5} = \frac{PA_1}{2}$

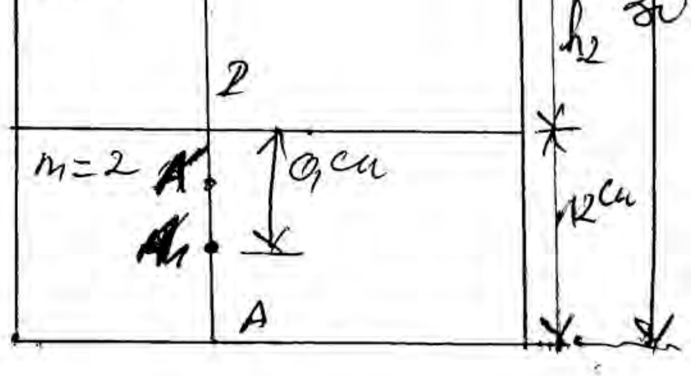
$\frac{HA_1}{2} = \frac{16}{1} \rightarrow HA_1 = 32 cm$

$h_2 = 0,75 . PA_1$

$PA_1 = 32 - 12 \rightarrow PA_1 = 20 cm$

$h_2 = 0,75 \times 20$ $h_2 = 15 cm$

181/



$$\underset{n}{A} \xrightarrow{P} \underset{n_2}{A_1} \xrightarrow{H} \underset{n_0}{A'}$$

$\frac{PA}{n} = \frac{PA_1}{n_2}$ $\frac{HA_1}{n_2} = \frac{HA'}{n_0}$

$\frac{12}{2} = \frac{PA_1}{1,5} \rightarrow PA_1 = 9 cm$

$HA' = HA_1 \frac{n_2}{n_2}$ $\quad HA' = \frac{R_2+9}{1,5}$ $\quad HA' = \frac{15+9}{1,5} \rightarrow HA' = 16\,cm$

$OH = 30 - R_2 - 12 \rightarrow R_2 = 15\,cm \rightarrow OH = 3\,cm.$

$OA' = OH + HA' \rightarrow OA' = 3+16 \quad OA' = 19\,cm.$

182/ $A = 60°$

Puisque $i = i' \rightarrow$ il s'agit d'une déviation min

$i = i'$ et $r = r'$

$A = r + r' \rightarrow A = 2r \rightarrow r = \frac{A}{2} \rightarrow r = 30°$

$\sqrt{2} \sin i = 2 \sin r \rightarrow \sin i = \frac{2}{\sqrt{2}} \sin r \rightarrow \sin i = \frac{\sqrt{2}}{1} \sin 30$

$\rightarrow i = 45°$

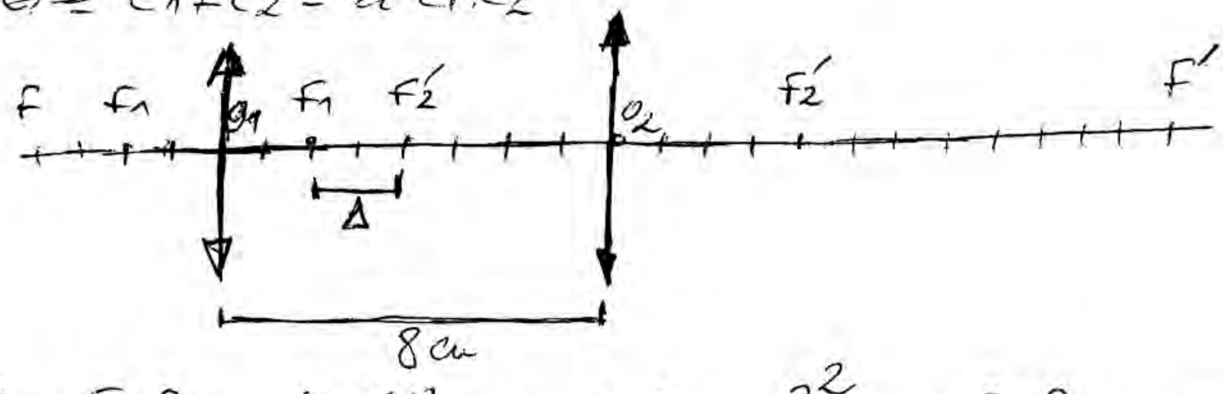
183/

$D = i + i' - A \rightarrow D = 45 + 45 - 60 \rightarrow D = 30°$

184/ $C_1 = 50\,\delta \rightarrow O_1F'_1 = \frac{1}{C_1} \rightarrow O_1F'_1 = 2\,cm.$

$C_2 = \frac{1}{0,04} \quad C_2 = 25\,\delta$

~~$G = C_1 + C_2 - e\, C_1 C_2$~~



on a $F_1F = -\frac{(O_1F_1)^2}{\Delta} \rightarrow F_1F = -\frac{2^2}{2} \rightarrow F_1F = -2\,cm$

on a $O_1F = O_1F_1 + F_1F \rightarrow O_1F = (-2-2) \quad O_1F = -4\,cm$

$\rightarrow$ Rep c

185/

on a $F'_2F' = \frac{(O_2F'_2)^2}{\Delta} \rightarrow F'_2F' = \frac{(4)^2}{2} \rightarrow F'_2F' = 8\,cm$

$O_2F' = (O_2F'_2 + F'_2F') \quad O_2F' = 4+8 \rightarrow O_2F' = 12\,cm$

$\rightarrow$ Rep a

186/ $A = 2\,\delta$

$A = \frac{1}{OPR} - \frac{1}{OPP}$ $\quad OPR = -\infty$ (oeil emmétrope)

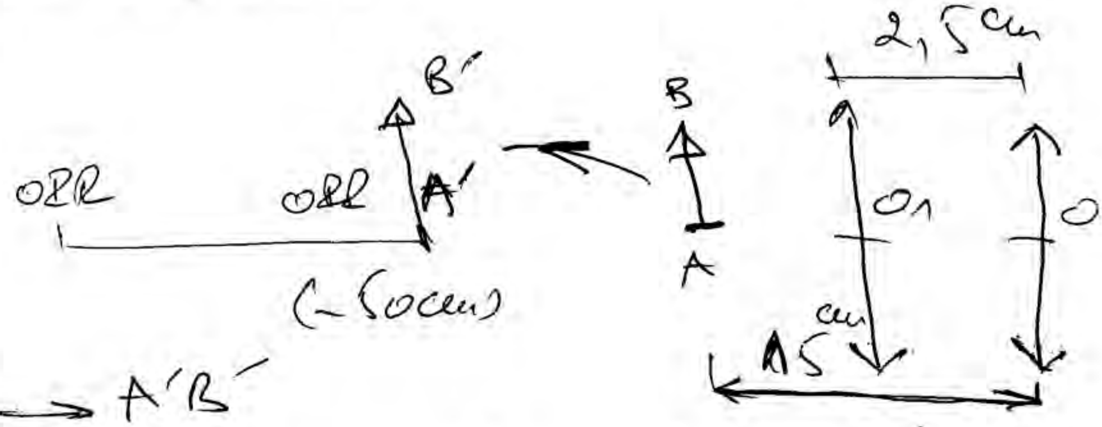
$\rightarrow A = -\frac{1}{OPP}$ $\quad OPP = -\frac{1}{A}$ $\quad OPP = -0{,}5\ m$

50 cm de l'oeil

187/ $C_{max} = \frac{1}{OT} - \frac{1}{OPP}$ $\quad C_{max} = \frac{1}{17\,10^{-3}} - \frac{1}{-0{,}5}$

$C_{max} = 60{,}82\ \delta$

188/



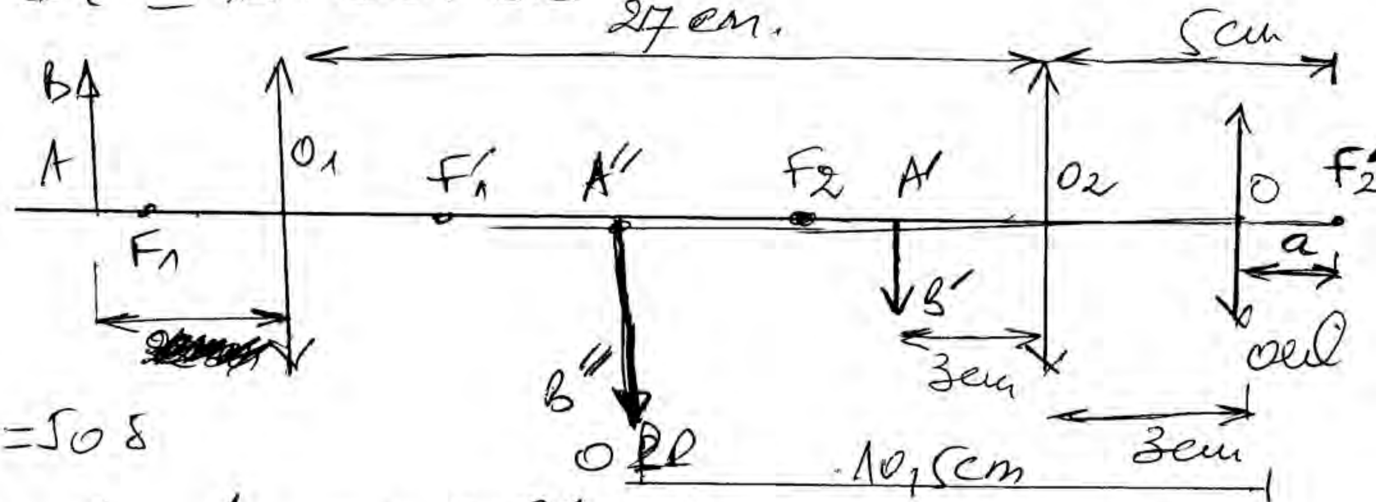
$AB \xrightarrow{1} A'B'$

$A \xrightarrow[O_1F'_1]{O_1} A'$ $\quad \rightarrow \frac{1}{O_1F'} = \frac{1}{O_1A'} - \frac{1}{O_1A}$

$\frac{1}{O_1F'} = \frac{1}{-47{,}5} - \frac{1}{-12{,}5}$ $\quad O_1F' = 16{,}96\ cm$

$C = \frac{1}{O_1F'}$ $\quad C = \frac{1}{16{,}96\ 10^{-2}}$ $\quad C = 5{,}89\ \delta$

189/ $P_i = \Delta \cdot C_{ob} \cdot C_{oc}$



$C_{ob} = 50\,\delta$

$O_1F'_1 = \dfrac{1}{C_{ob}} = \dfrac{1}{50} \longrightarrow O_1F'_1 = 2cm$

$(G_c)_{oc} = 5 \qquad G_c = \dfrac{C_{oc}}{4} \longrightarrow C_{oc} = 4G_c \qquad C_{oc} = 20\,\delta$

$O_2F'_2 = \dfrac{1}{C_{oc}} \qquad O_2F'_2 = \dfrac{1}{20} \qquad O_2F'_2 = 5cm$

$P_i = \Delta \, C_{ob} \cdot C_{oc}$

$\Delta = O_1O_2 - O_1F'_1 - O_2F'_2 \qquad \Delta = 27 - 2 - 5 \qquad \Delta = 20^{cm}$

$P_i = 0{,}2 \times 50 \times 20 \longrightarrow P_i = 200\,\delta$

190/

$AB \xrightarrow{ob} A'B' \xrightarrow{oc} \underset{(oeil)}{A''B'}$

$A'B' \longrightarrow A''B''$

$A' \xrightarrow[O_2F'_2]{O_2} A'' \qquad \dfrac{1}{O_2A''} - \dfrac{1}{O_2A'} = \dfrac{1}{O_2F'_2}$

$\dfrac{1}{O_2A'} = \dfrac{1}{O_2A''} - \dfrac{1}{O_2F'_2} \longrightarrow \dfrac{1}{O_2A'} = \dfrac{1}{-7{,}5} - \dfrac{1}{5}$

$O_2A' = -3cm$

$AB \xrightarrow{ob} A'B' \qquad \dfrac{1}{O_1A'} - \dfrac{1}{O_1A} = \dfrac{1}{O_1F'_1} \qquad \cancel{O_2A_2}$

$A \xrightarrow[O_1F'_1]{O_1} A'$

55

Suite 190

$$\frac{1}{O_1A} = \frac{1}{O_1A'} - \frac{1}{O_1F_1'} \longrightarrow \frac{1}{O_1A} = \frac{1}{24} - \frac{1}{2} \quad O_1A = -2,1818 \text{ cm}$$

191/ la Puissance du microscope est donnée par $P = |\gamma ob| \cdot Poc$

$$\gamma ob = \frac{O_1A'}{O_1A} \quad \gamma ob = -\frac{24}{2,1818} \quad \gamma ob = -11$$

$$Poc = Coc \left[1 - \frac{a}{d}\right]$$

$$Poc = 20 \left[1 - \frac{(-2)}{-10,5}\right] \quad Poc = 23,818$$

$$P = |-11| \cdot 23,81$$

$$P = 261,98$$

192/ le grossissement du microscope est donné par

$$G = P \times |oPP|$$

$$G = 261,9 \times |10,5\ 10^{-2}|$$

$$G = 27,5$$

193/

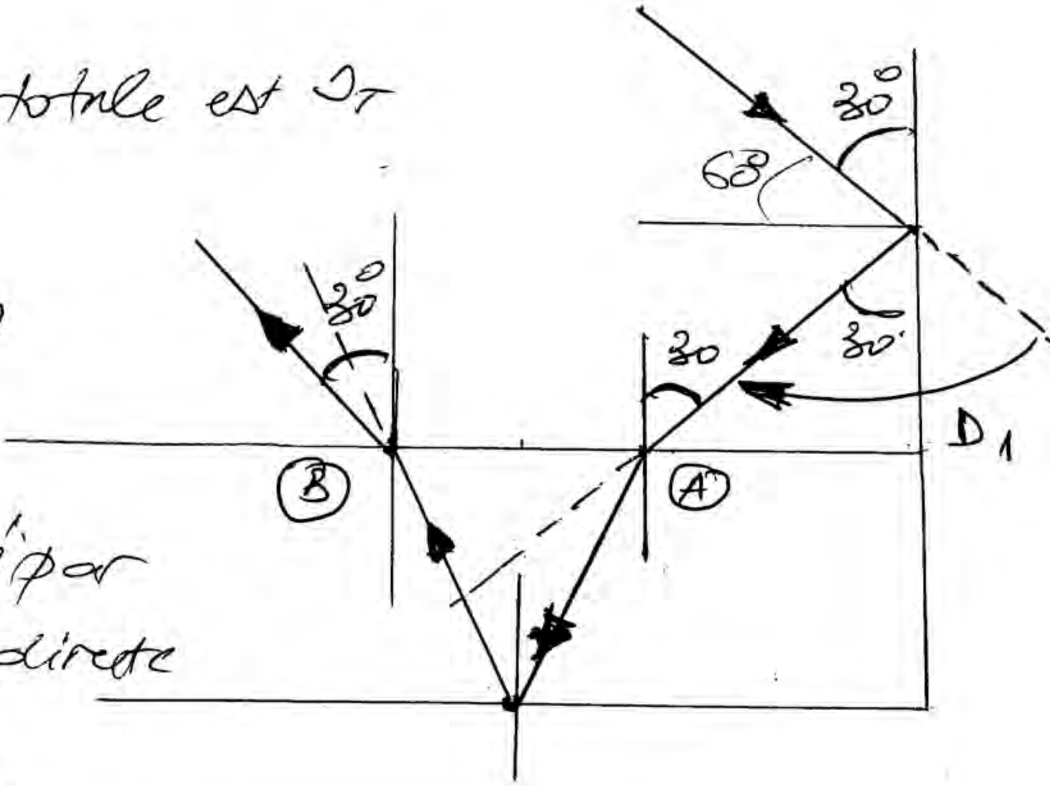
La déviation totale est D_T

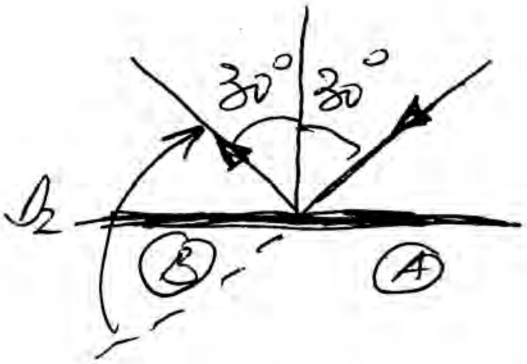
$D_T = D_1 + D_2$

$D_1 = 180 - 2\times 60$

$D_1 = 60°$

D_2 est calculé par la méthode directe





$D_2 = 180 - 2\times 30$

$D_2 = 120°$

$D_T = 60 + 120 \quad D_T = 180°$

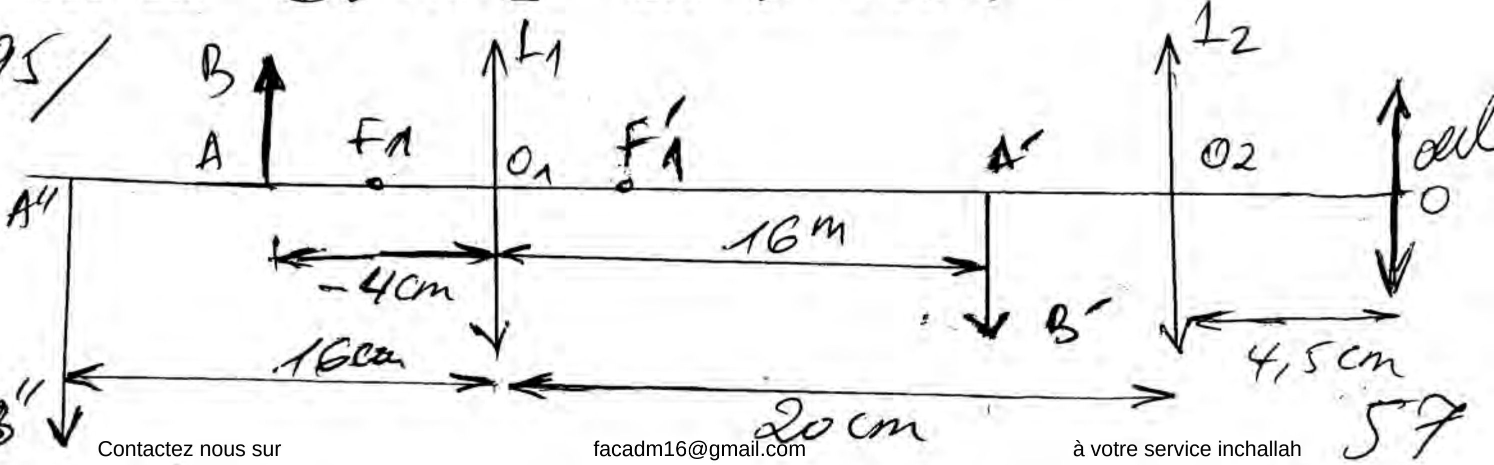
194/ $A = 5\,\delta \qquad A = \frac{1}{OPR} - \frac{1}{OPP}$

oeil emmétrope $\rightarrow OPR = -\infty$

$A = -\frac{1}{OPP} \rightarrow OPP = -\frac{1}{A} \quad OPP = -0{,}2\,m$

20 cm en avant de l'oeil.

195/

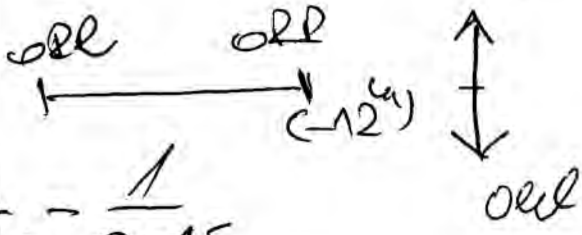


Suite 195

$AB \xrightarrow{L_1} A'B'$

$A \xrightarrow[O_1F'_1]{O_1} A' \to \frac{1}{O_1F'_1} = \frac{1}{O_1A'} - \frac{1}{O_1A} \to \frac{1}{O_1F'_1} = \frac{1}{16} - \frac{1}{-4}$

$O_1F'_1 = 3{,}2$ cm



$A'B' \xrightarrow{L_2} A''B''$

$A' \xrightarrow[O_2F'_2]{O_2} A'' \to \frac{1}{O_2F'_2} = \frac{1}{O_2A''} - \frac{1}{O_2A'}$

$\frac{1}{O_2F'_2} = \frac{1}{-36} - \frac{1}{-4} \to O_2F'_2 = 4{,}5$ cm

196/ l'image A''B'' se trouve à $(36+4{,}5)$ cm $= 40{,}5$ cm de l'oeil

on cherche OPR.

$A = \frac{1}{OPR} - \frac{1}{OPP} \to \frac{1}{OPR} = A + \frac{1}{OPP} \to \frac{1}{OPR} = 5{,}5 + \frac{1}{-12}$

$\frac{1}{OPR} = 5{,}5 + \frac{1}{-0{,}12}$ $\quad OPR = -35{,}3$ cm

l'image étant à 40,5 cm de l'oeil, donc elle n'est pas dans le champ de vision de l'oeil donc l'observateur ne voit pas l'image A''B''

198/ voir N° 1

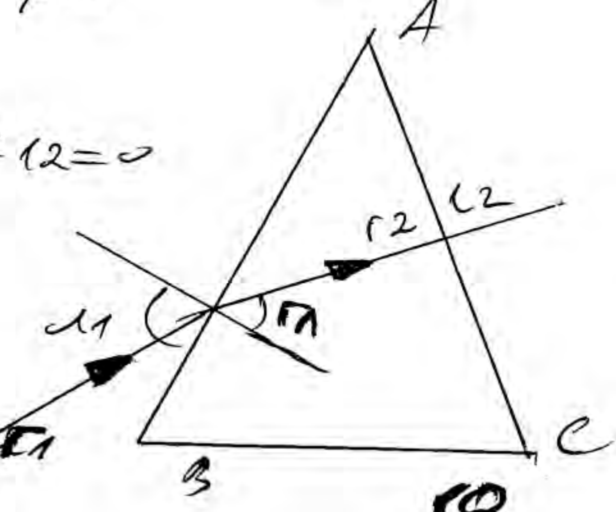
199/ rayon ⊥ à AC $\to r_2 = 0$ et $i_2 = 0$

$D = i_1 + i_2 - A$

$A = r_1 + r_2 \to r_1 = A = 40°$

$n_0 \sin i_1 = n \sin r_1 \quad \sin i_1 = \frac{n}{n_0} \sin r_1$

$\to i_1 = 56{,}7 \to D = 16{,}68$



200/ $C < 0 \to$ Myope

$OPP_c = -50\,cm \to$ Presbyte

donc Myope + Presbyte

201/ $C = \frac{1}{OPP} - \frac{1}{OPP_c} \to \frac{1}{OPP} = \frac{1}{OPP_c} + C$

$\frac{1}{OPP} = \frac{1}{-0,5} + (-1) \to OPP = -33,3\,cm$

202/ $A = \frac{1}{OPR} - \frac{1}{OPP}$

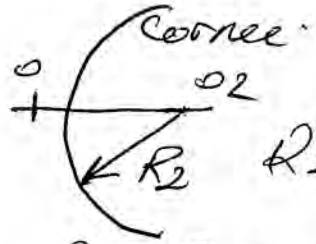
On calcul OPR $\quad C = \frac{1}{OPR} - \frac{1}{OPR_c} \quad OPR_c = -\infty$

$C = \frac{1}{OPR} \to OPR = \frac{1}{C} \to OPR = \frac{1}{-1} \quad OPR = -1m$

$A = \frac{1}{-1} - \frac{1}{-0,333} \qquad A = 2\delta$

203/

$C = \frac{1}{OF} = \left(\frac{n}{n_0} - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$



$R_2 > 0$

$\frac{C}{\frac{n}{n_0} - 1} = \frac{1}{R_1} - \frac{1}{R_2}$

$R_2 = 20mm$

$\frac{1}{R_1} = \frac{1}{R_2} + \frac{C}{\frac{n}{n_0} - 1} \qquad \frac{1}{R_1} = \frac{1}{20 \cdot 10^{-3}} + \frac{(-1)}{\frac{1,5}{1} - 1}$

$R_1 = 20,8\,mm.$

204/ AB objet réel $|AB| = 4cm \quad OF' = 4\,cm$

A'B' réelle $\to OA' > 0 \quad OA' = 20cm$

$\frac{1}{OA'} - \frac{1}{OA} = \frac{1}{OF'} \to \frac{1}{OA} = \frac{1}{OA'} - \frac{1}{OF'}$

suite 204 / $\frac{1}{OA} = \frac{1}{20} - \frac{1}{4}$ $OA = -5$ cm

$\gamma = \frac{OA'}{OA}$ $\gamma = \frac{20}{-5}$ $\gamma = -4$ $|\gamma| = \frac{|A'B'|}{|AB|}$

$|A'B'| = |\gamma|\,|AB|$ $|A'B'| = |-4|\,4$ $|A'B'| = 16$ cm

205/ La mise au point étant réalisée sans accommodation par un oeil normal → A'B' est à l'infini → objet sur F de la lentille.
→ donc AB à −4 cm de L.

206/ $P = \frac{\alpha'}{|AB|}$ A'B' à l'infini → $P = C$

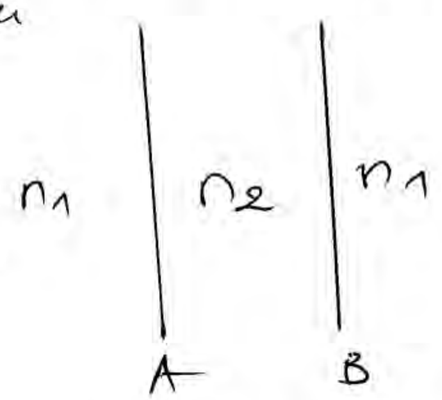
$P = C = \frac{1}{OF'}$ → $P = \frac{1}{0{,}04}$ $P = 25\,\delta$

$\alpha' = P \cdot |AB|$ $\alpha' = 25 \cdot 0{,}2\,10^{-3}$ $\alpha' = 5\,10^{-3}$ rad

Questions de cours

- un microscope est constitué de deux lentilles CV
- Le grossissement G est une notion qui dépend de la nature de l'oeil de l'observateur.
- L'effet Purkinje apparaît en vision scotopique → Rep (d)
- Dans le cadre de la transduction rétinienne, l'étape photochimique traduit le fait que : Rep (c) les batonnets se caractérisent par un seul pigment.
- la topographie rétinienne aide à expliquer pourquoi → Rep (b)
- Dans la zone péri-phérique de la fovea, se trouvent exclusivement → Rep (d)

- L'astigmatisme régulier : une cornée qui n'a pas la même courbure selon ... Rep (a)
- ~~Réponse~~ C
- Schéma qui traduit la réalité → (c)
- Le dioptre A est // au dioptre B, donc il s'agit d'une lame placée dans 1 milieu d'indice n_1.



- le rayon se propage alors de manière rectiligne dans le milieu 2.

→ $i \geq i_0$ avec $\sin i_0 = n \sin(A - \theta_L)$

$A \leq 2\,\theta_L$

- on peut parler d'une loupe lorsqu'il s'agit d'une lentille CV avec un objet AB entre le foyer objet F et le centre de la lentille.
- La skiascopie est une méthode objective qui permet de déterminer certaines caractéristiques de l'oeil → Rep (a)
- Engendre la translation d'un rayon incident qui frappe cette lame. → Rep (b)
- Dans la zone centrale où la fovéa se trouvent principalement des cônes → Rep (b)
- Dans le cadre de la transduction rétinienne l'étape photochimique traduit le fait . les bâtonnets se caractérisent par un seul bâtonnet → Rep (a)

- Dans le cadre de l'astigmatisme régulier nous pouvons distinguer 5 types d'astigmatisme → Rep (c)
- L'astigmatisme régulier est → Rep (b)
- La presbytie est conséquente à la diminution du pouvoir d'accommodation → Rep (d)
- Corriger l'astigmatisme régulier revient à restituer une réfraction égale selon les différents méridiens de la cornée → Rep (a)
- Les cônes se caractérisent par une vision
  - une vision fine et précise Rep (c)
- Dans le cadre de la trivariance visuelle la luminance est une grandeur mesurable Rep (c)
- L'effet Purkinje traduit
  Rep (d)
- La rhodopsine est un pigment qui caractérise les bâtonnets → Rep (c)
- La skiascopie est une méthode objective qui permet de mesurer le degré éventuel d'une myopie ou hypermétropie → Rep (b)
- $P = 5\,\delta \quad P = \frac{1}{OPR} \rightarrow OPR = \frac{1}{P} \rightarrow OPR = 0{,}2\,m$

  $A = \frac{1}{OPR} - \frac{1}{OPP} \rightarrow \frac{1}{OPP} = \frac{1}{OPR} - A \rightarrow OPP = 1\,m$

  le champ de vision étant virtuel il ne peut pas voir distinctement les objets.

  0,2m 1m

  champ virtuel

- En vision scotopique la couleur bleue apparait plus lumineuse que la couleur rouge → Rep (a)
- En vision diurne, l'acuité visuelle décroit de la fovéa vers la rétine périphérique → Rep (a)
- Dans le cadre de la transduction rétinienne l'étape photochimique traduit le fait : chaque cône se caractérise simultanément par 3 pigments ≠ Rep (c)
- Dans le cadre de la vision
  Rep (d)
- Dans la zone centrale de la fovéa se trouvent exclusivement → Rep (d)
- la kératométrie est une méthode objective qui permet de déterminer certaines caract de l'oeil → Rep (c)
- Le ménisque DV, devient une lentille CV en changeant l'indice du milieu dans lequel baigne la lentille.
- La trivariance visuelle repose sur les grandeurs mesurables et repérables → (c)
- La skiascopie permet de caractériser le degré éventuel d'une hyperopie
- une jeune adulte myope ne sera jamais presbyte parce que son PP est trop proche de l'oeil → faux.
- Dans le cadre de la biophysique, l'effet Purkinje apparait en vision photopique → faux.